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PC PILOT

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PC PILOT

THE CREW

EDITORIAL

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With many thanks to Alex and Doug, founders of the original PC Pilot four years ago, who kindly gave permission for us to publish under the same name.

SUBMISSIONS

We will gladly accept and review for publication any letters, articles, photographs or other contributions. We cannot guarantee publication nor, regrettably, return items sent to us or be responsible for their loss. We will try and reply where possible. Any letters are assumed suitable for publication unless we are otherwise notified.

LEGAL & GENERAL

Editor's letter

Welcome to Issue 14 of PC Pilot, and seasonal good wishes to all our readers. Christmas in the world of flight simulation is certainly a lot rosier this year, with some really exciting releases that will probably leave Santa spoilt for choice. If we can be permitted a little smug satisfaction, our hobby seems to be doing remarkably well for a genre that was consigned to history a year ago. The new version of Flight Simulator looks excellent and apart from some issues with the autopilot it should be a winner. Meanwhile, if combat's your bag, IL-2 Sturmovik is going to set the standard for some time to come. Could this be the first non-Microsoft flight sim to spawn a family of add-ons? Elsewhere, Comanche 4 from Novalogic should be in the shops for Christmas, Lock-On is set for release next year and there's a plethora of new add-ons due to come out for FS2002. You'll be glad to hear that PC Pilot is overflowing with the Christmas spirit this year and you'll find two great competitions on pages 6 and 11, plus a fantastic IL-2 offer on page 5.

However, not all is sweetness and light. Christmas is not a happy time for everyone and we recently received a letter from one of our readers expressing his frustration with problems we encountered when loading a piece of FS2002 'optimised' software. We forwarded his letter to World Air Simulations, Papa Tango and Ariane Studios for their comments and received the following reply.

Thank you for your letter dated 16th November from a "Mr Abrahams" which we received today. Can you please supply us with Mr Abraham's land address so we can contact the individual and discuss these unsubstantiated claims and matters directly.

Please confirm by return that you will not be printing any letters in any edition of PC Pilot containing claims that are untrue and unsubstantiated. We advise you that any publishing of articles or letters in the magazine that are unsubstantiated, not "run by us" or considered defamatory may lead to legal action against you, PC Pilot and/or its Publishers. We have reliable information that, as of today, the latest issue of PC Pilot is not in, or about to go to, print.

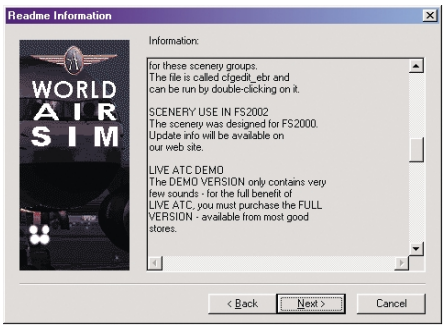
Thanking you in anticipation.

Sincerely,

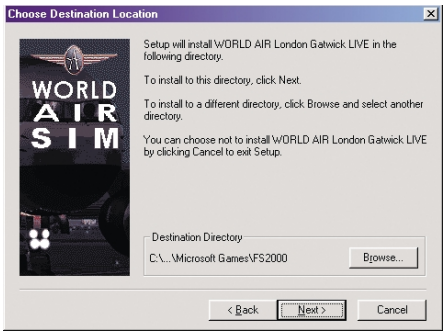
WORLD AIR www.worldairsim.com
E-Mail: execpilot@ukonline.co.uk

As you can see, the letter doesn't really address any criticism of the software. It's anonymous, which might be a sign of a lack of bottle or, more likely, an attempt to write the letter in a similar style to one penned by a legal firm. The somewhat amateur threat of court action seems an odd interpretation of customer service. Not to be put off, we purchased one of the programs mentioned in our reader's letter – London Gatwick Live. At £29.99 it seemed a bit steep for one of the airports previously available in Gary Summon's UK2000 series (shareware copy on PC Pilot Issue 9 CD). However, it's marked as 'Optimised for Flight Simulator 2002' so we thought that this might explain the high price.

We loaded it in Flight Simulator 2002 and during the loading we took the screenshots below:



It doesn't appear to be very well 'Optimised'



The default directory is still FS2000

We replied to the mail from 'World Air' and outlined our concerns. A prompt reply came back from the mysterious 'World Air' who said:

Our products, like many others on the market we are sure, give the choice of where to install them as an option made via the install window. Where some elements do not work in either Flight Simulator versions, as with Just Flight's or any other company's software, the parties concerned do all they can to correct any problems and make upgrades or "patches" available for free download on our websites.

In the case of installing Gatwick, choose the install path as your FS2000 or FS2002 path (you can choose to use the scenery library to install it as with all scenery products or you can go to our web site and download the FS2002 update which also places a new auto installer in the Gatwick Scenery folder to allow users to add the line to their scenery config file at a later time, if they wish to modify their folders. Follow the instructions carefully - Gatwick will be compatible with FS2002. (We have screen shots of this scenery working in FS2002 with little problems). The developer of London Gatwick - LIVE has apologised for the error that caused the "Shareware" wall to appear and this has been corrected - the update was placed on our site within days of it occurring and further enhancements are planned for the benefits of all our registered users.

There are some issues with the liveatc.dll that are being addressed in FS2002 with certain XP/FS/Win combinations. The program had been run and tested and found to work optimally in both FS2000 and FS2002.

If our customers have any problems, they know we offer an excellent support service by e-mail, fax or telephone. If you have any further queries about our products, we will look into them and come back to you with any comments and updates which we

expect you to take into account - not to mislead your readers by ignoring our statements and going ahead with the publishing of misleading letters with the intent to damage this companies interests.

We expect you to be fair and unbiased in your reporting and also in your publishing of matter relating to this company. If we request you to not publish and warn you of any inaccuracies or misleading statements, we do so with good reason. We have stated, categorically, that the comments made by Mr Abrahams are misleading and inaccurate. Before you publish the letter from which they were taken in your magazine "as true" (as stated below), then we suggest you take legal advice before doing so.

So, there you have it. The publisher admits that the 'Optimised' product doesn't install into FS2002 without a patch. Something of a fundamental error when you take into account the description on the box. Luckily we'd bought the software from our local branch of Game so we were able to take advantage of their 'No Fuss Money Back Guarantee'(Electronics Boutique offer a similar deal) and get our thirty quid returned.

Doubtless, there will be much debate over the definition of the word 'Optimised' and 'Optimally' in the coming weeks.

In the meantime, we wish you and yours a very happy Christmas and a prosperous New Year. Thank you for your fantastic support during 2001 and we hope to fly with you in 2002.

Dermot Stapleton
Managing Editor

PC PILOT IL-2 READER OFFER

There's no doubting that Ubisoft have come up with a real winner in Oleg Maddox's IL-2 Sturmovik, and we were so impressed that we've managed to arrange a fantastic low-price offer for those of you who want to get hold of this superb simulation. The normal retail price of IL-2 is £34.99, but for only £19.99 plus postage (£3.00 in the UK, £5.00 overseas) we'll deliver a copy to your door. Give the crowds of hungry shoppers a wide berth and stay at home honing your combat skills instead. The offer is valid only while stocks last, so don't waste a second!

MONEY BACK GUARANTEE

Our 100% satisfaction guarantee means that if you are not totally satisfied then you can return your purchase to us for exchange or refund. Please contact us for details before sending goods back, if you wish to take advantage of this guarantee.

HOW TO ORDER

We aim to despatch all orders within 24 hours of receipt, though this may not always be possible. We will tell you if there is any significant delay. Please allow up to 14 days to receive your goods (longer if outside Europe).

Web: www.pcpilot.net

We offer secure online ordering from our website. Simply visit the site and follow the link.

Phone: 0870 900 0422 (calls charged at normal national rate).

Please call us between 9am-5pm (UK time) Monday – Friday and one of our operators will be pleased to take your order. Make sure you have your payment details to hand and, if you're calling from overseas, please remember the time difference and dial +44 870 900 0422.

Fax: 01480 357186 (calls charged at normal national rate)

If you are paying by credit card, you can fill in this form (or a photocopy of it) and fax it to the above number.

Post: Return this form (or a photocopy) together with your remittance (if you're sending a cheque) to:

PC Pilot, PO Box 11, St. Ives, PE27 3GW, United Kingdom

PLEASE SEND ME IL-2 STURMOVIK AT THE FANTASTIC PC PILOT PRICE OF £19.99 PLUS POSTAGE

Name (Mr/Ms) _____

Address _____

_____

Town/City _____ Post Code/Zip _____

Country _____ E-mail address _____

☐ IL-2 Sturmovik £19.99
☐ UK postage £3.00
☐ Overseas postage £5.00
☐ I enclose a cheque for a total of £_____

Please make cheques payable to PC Pilot Ltd. (cheques drawn on a UK bank account or International Money Order payable in Sterling only please)

OR ☐ Please debit my MasterCard/Visa/Delta/Switch £_____

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Expiry date ☐☐☐☐ Switch card issue No. ☐

OR Switch card valid from date ☐☐☐☐

Expiry date ☐☐☐☐

Signature:_____ **Date:** _____

COMMS

Age shall not weary them!

FROM: Nigel D. Sanderson

As a regular reader of PC Pilot may I add my bit to the discussion on Civil/Combat flying in your magazine. Can I say that I am 71 and probably your oldest reader. However, to the point – please keep your present mix in the magazine. I enjoy both combat sims and civil sims. Whether landing civil aircraft in the dark at Meigs or balloon busting over the Western front in an SE5, it all adds to the interest.

I have nothing but respect for those who prefer to fly a simulated 747 across the world. I may get there one day. The technical stuff in PC Pilot goes over my head, but I am sure that many readers love it. Live and let live!

We reply:

Many thanks for your reasoned words of wisdom Nigel. We'll try to keep the balance and try to please most of our readers most of the time. However, we have to disappoint you on your seniority amongst our readers. We know of one regular reader of 81 and a couple of late seventies. The first PC Pilot reader to get a telegram from The Queen gets a free trip in the G-Machine at Farnborough

FROM: Peter Adshead (subscriber for the moment)

I can't believe you put three pages of Train Simulator in the latest issue of PC Pilot. The discussions over getting the right balance between military and civil flight sims will pale into insignificance compared to the argument over whether you should include train sims, car racing sims, battle tank simulations etc. etc. I'm not the only reader who is dismayed to see trains in PC Pilot. Otherwise, keep up the good work. All issues up to now have been great.

We reply:

Including Train Simulator was a bold decision, but based on the logic that many flight simulation enthusiasts are also model railway fans. We know that from the number of copies we sell in model railway shops, so it's back to the despatch box to let the debate rage on!

FROM: Trevor F. Bunce

The recent review of Microsoft Train Simulator in PC Pilot prompted me to go out and buy a copy. I must say that I am NOT disappointed. The graphics are first class and I only wish the same quality could be obtained from Flight Simulator 98 or 2000. I also purchased the Roundhouse add-on, which gives extra trains, routes and situations. Excellent stuff! I would be interested if the magazine included further information about this excellent product in future issues.

We reply:

We're glad you're enjoying Train Simulator Trevor, but as we can't get everyone to agree that Spitfires and F-15s have a place in PC Pilot, we think regular train coverage might be a viaduct too far!

THE PC PILOT IL-2 STURMOVIK COMPETITION

Win an exclusive signed IL-2 print

To celebrate the long-awaited launch of IL-2 Sturmovik, the publishers have tempered our impatience by giving us some great prizes for a competition. First prize is an exclusive signed print of some IL-2 artwork, which you won't be able to find anywhere outside the developers' top secret bunker in Moscow. For the runners-up we'll be giving away five copies of IL-2 Sturmovik, the stunning combat simulation which is monopolising the PC Pilot computer and is currently responsible for the editor's prolonged absences from his desk. For those of you whose combat skills would be sharpened up by some new hardware, we'll also be giving away five excellent Thrustmaster Top Gun Afterburner throttle and stick combinations, as used daily on our office PC. And that's not all…five further runners-up will receive a copy of Mike Sharpe's Aircraft of WWII book, a copy of which will be a worthy addition to any self-respecting combat enthusiast's bookshelf. Good luck!

HOW TO ENTER

All you have to do is correctly answer the following questions:

1) Russian soldiers nicknamed the IL-2 Sturmovik:

a) The cement plane
b) Black death
c) The concrete plane

2) IL stands for:

a) Ilyushin
b) Ilyovik
c) Ilyushka

3) How many members were normally in an IL-2 crew?

a) Three
b) One
c) Two

The competition is open to PC Pilot readers from anywhere in the world with the exception of PC Pilot staff (and their friends, vodka suppliers etc.)

You can send your answers by e-mail to comps@pcpilot.net or on a postcard/back of an envelope to:

IL-2 Competition
PC Pilot
PO Box 11
St. Ives
PE27 3GW
United Kingdom

Please make sure you clearly state your full name, address and e-mail address (if you have one) and also which prize you'd prefer if you win one of the runners-up prizes. The competition closes on 31st January 2002 . Entries received after that date cannot be included and prizes will be drawn at random from correct answers.

FROM: Ian Shuttleworth

I just wanted to let you know what a super magazine you have. I've been a flight sim enthusiast for a few years now, and I sometimes manage to get some real flying in now and then with my mate, in his Piper Warrior 2. I really wanted to tell your readers about a recent visit to the Luchtvaart Hobby Shop in Holland that was recently reviewed in issue 11 of PC Pilot. A friend and myself decided to make a day of it, and arranged to go to the shop on Saturday the 29th September.

We booked ourselves on the 06:40 Easyjet flight out of Liverpool, and in about 45 minutes we arrived at Schipol airport. We hopped on a train from the terminal, as far as the first stop, to a place called Hoofdorp, then from Hoofdorp, we took the number 140 bus, that drops you off right outside the hobby shop, a journey of about 25 minutes. I must say, the shop was out of this world, wall to wall with aviation goodies, it was like an Aladin's cave, with rows of useable flight sims, all set up for customers to play on, and hundreds of models, videos, etc.

We must have spent about two hours in the shop, and spent a small fortune!

Then, to make the day even more enjoyable, we walked the 5 minute walk up the road into the small Dutch town of Aalasmeer. It was a great place, with some really nice shops, and a few good bars, so after a few hours there, we made our way back to Schipol, for our 17:30 flight back. Unfortunately, the terraces were closed, due to the recent events, but the view from the upstairs cafe was very good indeed.

We did a bit more souvenier hunting in the airport shopping centre and boarded our flight back, arriving in Liverpool at 18.20. All in all it's well worth a visit, and is easily reachable throughout the UK, by low cost airlines from Scotland, the Midlands, and the south of the UK. Take my advice, and give it a try, but don't forget to bring the wife a bunch of flowers back!

We reply:

Can anyone else recommend a suitable venue to unload one's spare cash? Any more of this and PC Pilot is going to be getting 'Luton letters' from bank managers asking us to desist from leading their customers astray!

FROM: Nigel Hobbs

Just a quick note to congratulate you on a wonderful magazine. I have only recently come across your magazine in my local newsagent (issue 11) and have bought it ever since including the back issues. I hope you keep up the good work. On another matter I feel I must comment on your first article in issue 13 'Where words can never be enough' and relate what happened to me. Having been on holiday just after the 11/09/01 attacks I was late in collecting issue 12. Having walked up to the counter and asking for all my magazines, one of the female staff finding PC Pilot among them commented to her friend "Oh look another Terrorist learning to fly on his computer." Having lost four good friends in the attack I will not even start to repeat what I said to them, not that you could print it anyway. Suffice to say that the newsagent no longer has my order. However it only goes to show that what you say about mud sticking is oh so very true. As to the report by the BBC showing FS2000 set up with a UA plane heading towards the Twin Towers, am I the only person who found this somewhat insensitive and in very bad taste at a time when the world was coming to terms with the enormity of what had happened.

We reply:

Not being experts at discovering which celebrities are engaging in extra-marital liaisons, we can't really class ourselves as proper journalists at PC Pilot. However, the old adage "don't let the truth get in the way of a good story" is still true for many in our 'noble' profession. The story they all wanted was that Microsoft (a successful company which lazy hacks always think needs taking down a peg or two) were peddling the actual piece of software that trained terrorists to fly airliners in a few minutes. The phrase "available in any High Street" always sounds good in these stories. However, the truth, for once, got in the way of the story and it looks like flight simulation can return to being a harmless hobby enjoyed by a few million souls around the world.

NEWS

20GHz in five years?

Intel have recently announced a development that will help them to build processors containing more than a billion transistors, which will run at a phenomenal 20GHz. The technology responsible is called BBUL (Bumpless Build-Up Layer) packaging, and will allow faster performance, lower power consumption, and smaller overall processor size. It'll be five or six years, however, before they plan on implementing the technology, but at least you can start saving. The design of processors and transistors is well out of our league, but those amongst you who are technically minded can take a look at www.intel.com/research/silicon

Search and Rescue 3 announced

Global Star Software recently announced that it would publish Search and Rescue 3 in North America. Developed by InterActive Vision, this is the third instalment of the popular helicopter flight sim. Search and Rescue 3 will feature several additions, including three rescue helicopters, upgraded sound and graphics, and over 100 missions of varying difficulty. Search and Rescue 3 is slated for a late 2001 release. The expected price is about £20.00.

Climbing Out Competition

Firstly, many thanks to all of you who entered the competition in Issue 12 - we received entries from every corner of the globe. The first entry to be drawn out of the editor's WW1 flying helmet was Mr Joseph Brown; we hope Kenneth McDonagh's Cessna print is providing some inspiration for his flying. Congratulations also to the runners-up, who should have already received their prizes: Peter White, Matthew Fenech (Malta), Paul Finkhouse, N.P. Vibert (Jersey), Thomas Arthur, John Achor (USA), Nicholas Pitsos, Gary Evans (Australia), Leonard White, Charles Hart Jr. (USA), Jason Ross, Ron Shusterman (USA), J. Rollo, Dave Stewart, Helmut Schlimm (Germany), Brian Hulme, Mats Wiik (Finland), G. Sellick, and Srini Kadaba (Saudi Arabia).

THRUSTMASTER HOTAS COUGAR

ThrustMaster's HOTAS 2000 is now the HOTAS Cougar. HOTAS is an acronym for Hands On Throttle and Stick, and the two sticks mimic the military gear, which allows the pilot to control many targeting and avionics functions without removing his hands from the stick and throttle. Billed as the most programmable gear ever, the hardware works with any version of Windows, has no special drivers and is all USB.

We're told that the precision and resolution of the gear is almost five times that of the old F22 and TQS. This means precise control and quick response. The throttle features a high resolution microstick, and is not limited to the four directions of the old cursor control.

Software is by James Hallows and includes quick tutorials, though the stick will ship with ready-made configuration files for all popular simulations. The two stick, all-metal set will be released in late December and should cost around £200.00.

CHRISTMAS BONUS ON ITS WAY?

If you're lucky enough to receive a hefty Christmas bonus, or any of your wealthier friends ask you what you'd like for Christmas, you might want to get in touch with Virtualaviation. Their £10 million full-motion 747 simulator at Heathrow is still open for business, and you'll get a full pre-flight briefing as well as an experienced pilot to accompany you. Prices do vary depending on whether you go alone or with a few friends, and it's not cheap, but as a once-in-a-lifetime experience it's unbeatable. Apparently many people use the simulator to get over their fear of flying, but we don't expect that to apply to many of you! Visit www.virtualaviation.co.uk or call them on 01223 300300 and impress them with your skills.

100 YEARS YOUNG

October 29th 2001 marked a very important centenary in the history of British aviation, as it was this date in 1901 that marked the founding of the Aero Club. The inspiration arose during a flight in a balloon over Sidcup, Kent by Frank Hedges Butler, his daughter Vera and the Honourable Charles S. Rolls, of Rolls Royce fame. In 1910 the Club was honoured by the prefix "Royal". The patronage continues to this day with HM The Queen as Patron and HRH The Duke of York as President. 1910 also saw the Club place its Sheppey flying ground at the disposal of the Army and almost all the pioneer aviators of the Army and Navy learned to fly on machines owned by members of the Club at a time when the Services possessed no aeroplanes. These pilots went to form the core of the Air Battalion - later the Royal Flying Corps and the Royal Naval Air Service who combined on April 1 1918 to form the Royal Air Force.

The Club's involvement in air sports was amply demonstrated in 1914 when the Schneider Trophy was first won for Britain by a Sopwith Tabloid seaplane entered by the late Sir Thomas Sopwith on behalf of the Royal Aero Club of which he was a leading member.

The subsequent history of the Schneider Trophy air race and of the collaboration between the British aircraft industry, the Royal Air Force and the Royal Aero Club led directly, through the Supermarine S6, S6B and the Rolls Royce R engine, Lady Houston and their victories in 1929 and 1931, to the Spitfire, the Hurricane, the Merlin engine and the winning of the Battle of Britain in 1940.

The Royal Aero Club's MacRobertson air race to Australia in 1934, through the victorious DH Comet racer and prominence of the B247D and DC-2, did much to promote the coming into service of advanced monoplanes with the RAF Bomber Command by 1939.

Testimony to these events exists in the form of an archive collection of documents and photographs. Cups and trophies and fine art images are among the many items in the Royal Aero Club collection stored at the Royal Air Force Museum, Hendon. In 1998, the Royal Aero Club Trust, a charity, was established. Its aims are to conserve this unique collection of aviation heritage for future generations and to encourage 'Youth in the Air'.

This significant birthday, spanning as it does the whole history of aviation, should not pass unnoticed and you can find out about the Club, past, present and future at www.royalaeroclub.org

DANIEL DEMOULIN

Shortly after Issue 13 went on sale, we had many enquiries from readers asking about the outstanding cover artwork, which was also used for Just Flight's Combat Aces. Our sincere apologies to Daniel deMoulin, who kindly allowed us to use his image and whose credit was inexcusably omitted. Daniel is based in Portland, Oregon (USA), and you can see more of his work at www.eyemagination.com/planes. 1/8 scale handcrafted models of WWI and WWII planes, built by Paul Edgerly, are photographed and then skilfully combined with aerial images to give the stunning results shown here. This image, along with 21 others, can be bought as a downloadable screensaver from www.secondnaturecd.com/scalfigby dan.html Dan tells us that he has recently gone solo in a Cessna 152 on his way to obtaining his PPL, and mentions that extensive practice on the Fly! series of simulators have helped tremendously in preparing him for the real thing.

History Lesson

Jos Grupping recently announced the opening of his site dedicated to the history of Flight Simulator. If you want to see where it all came from, go to: http://simflight.com/fshistory. Jos told us: "Although I worked very hard on it during the past half year and more, it is far from finished yet. On the other hand, I thought is was far enough to open to the public. Call it a beta version. I hope to add the missing pages before the end of the month and then I'll sweep the whole site to correct mistakes and improve on the pictures. Call it a major patch. You see, I've learned from Microsoft!"

Voices on The Aerodrome

If you use Roger Wilco for voice comms or ATC when flying online, then it might be worth your while to visit the main page of www.aer.ip3.com where there's a 24/7 base station called FS Unicom. One click and you are connected. It gives free voice comms via Roger Wilco (free download) to anyone on the Internet, and can be used in all sims, on the Zone, Hyper Lobby or anywhere else where you chatter online. This is a spin-off from the existing Aerodrome base stations for members and is free for all to use. If you click on the icon, your RW will open and take you directly to the FS Unicom channel.

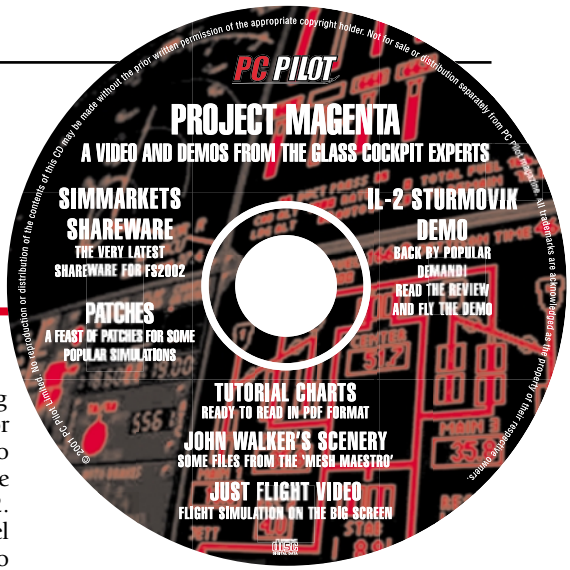
Comanche for X-Box

Some time ago there was abject panic amongst a few flight sim pundits when Microsoft announced the development of their X-Box console. It was seen as the death knell for flight sims and dire predictions were made, although the recent release of FS2002 has demonstrated that Microsoft is still committed to the PC platform. However, NovaLogic has officially announced that their globally successful Comanche franchise will be coming to the X-Box system in late 2002.

Site expansion

Belgian based online retailer, Simware Simulations tell us that they've expanded their website www.simw.com, which is completely dedicated to the world of simulations. Simware's Ulric Longfils said: "It's faster, safer, more user friendly; there's fast search by category, more and more new products, books, gifts ideas… it's THE website to bookmark for every simulation addict."

ON THE CD



PROJECT MAGENTA

If you fancy rising to the challenge of building your own airliner cockpit, or want to enhance your 'airline' experience in Flight Simulator, then Project Magenta (www.projectmagenta.com) are going to be pretty indispensable. They design software aimed specifically at fans of glass cockpits and PM's Enrico Schiratti has kindly offered PC Pilot readers a chance to press their noses against the glass of the Project Magenta shop window. We asked Enrico to give us an introduction to the files:

"With the very kind support of PC Pilot Magazine, we are able to bring some of our world to your PC. Admittedly, it is a rather extreme way of experiencing Microsoft Flight simulator, but it is quite a unique feeling and although we are confronted with it every day, we still find it very exciting. To get you into the mood and whet your appetite you will find a video on the CD that was prepared to promote our system. It should give you a rather good idea of what this is all about.

"Should you wish to dig deeper, you will find the demo versions of our Boeing-Type Flight Management System software on the CD as well. The Glass Cockpit, the CDU/FMC and the MCP/Enhanced Autopilot.

"There are various ways of running the demo software. If you merely want to have a general idea, just click on the program icons in the subfolder directly from the CD; if you feel like it, copy them to your hard drive. Going one step further, once you have FSUIPC installed in the Modules Folder of FS, you can see the whole thing in motion. Install WideFS if you have a computer network at your disposal.

"Please let PC Pilot know if you are interested in seeing more of our products. We have additional software, such as the Airbus-type suite of programs that could be included on other PC Pilot CDs."

SIMMARKETS SHAREWARE

SimMarkets have wasted no time in putting together some marvellous new stuff for Flight Simulator 2002. As a special gift to PC Pilot readers you'll find a rather nice Beech Baron 58 designed for FS2002. However, that's just a taster, because Miguel Blaufuks and his colleagues are proud to present this great feast for your delectation!

Shareware:
FSMETEO 5
QUICKMAP
FSNAVIGATOR
FS SCENERY MANAGER
SIMFLYERS SCENERIES (LIRF, LIBD, KATL, KMCO, KEWR, EGCC)

Freeware:
CYPRUS MESH

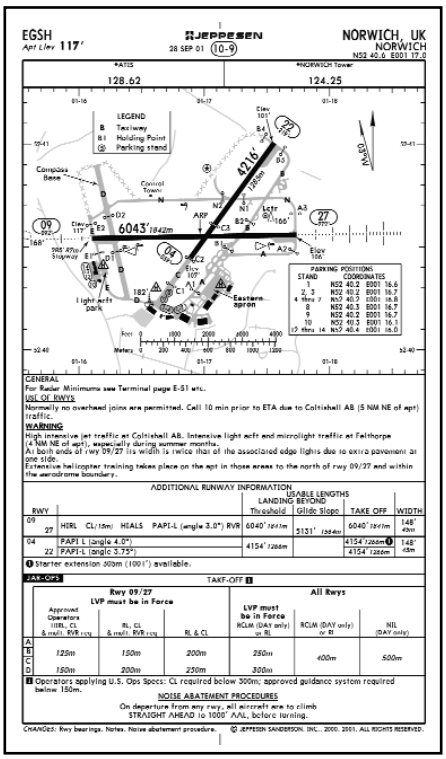
Full details on purchasing the shareware can be obtained from their website at www.simmarket.com

PATCHES GALORE!

Take some time over the holiday season to tidy up your hard drive and make sure all your simulators are working at their best. There's a handy set of patches on this CD, including (by popular demand) a few bits for Falcon 4.0. We've also included patch 1.05 for B-17 and a handful of the Fly!II patches.

CHARTS

The charts for our latest tutorial are on the CD in easy-to-use PDF format. If you have any trouble accessing the charts, go to 'My Computer', left click on the CD icon and select 'Explore'. You can then open the folders as required. We have also included sections of the visual charts EB-EH as .tif files. You should be able to open these in Windows using Kodak Imaging (in Accessories).

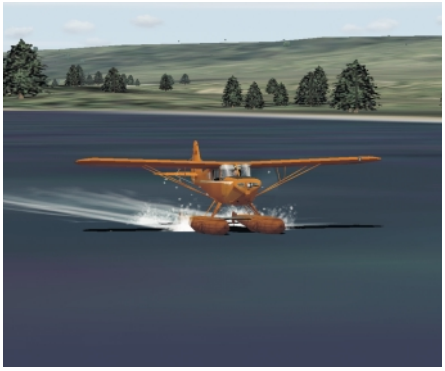


JOHN WALKER'S SCENERY

Enjoy the feature about John Walker on page 41 and then check out what he can do! PC Pilot have long been fans of John's creations and we hope you enjoy the ones on the CD.

THE STAR DOWNLOAD

Many of our readers have trouble finding download files (come on websites – let us search by filename!) so to cut down on the bother we've included this excellent model of a Canuck 80 on our cover CD. With grateful thanks to Bill Lyons for letting us get his tail-dragger out to a wider audience.



PETER DOWSON'S UTILITIES

Peter Dowson's many popular flight sim utilities are already out in FS2002 versions and he's kindly allowed us to include them on the latest CD. New versions will probably be out by the time you read this (we should call him 'Prolific Peter') but these should hopefully be of use to anyone who has now got FS2002. Don't forget to take a look at the Project Magenta software and video!

IL-2 STURMOVIK DEMO

We included this excellent demo on our last CD, but as we've got a full review, a competition AND our IL-2 Christmas offer in this issue, we'd thought you might like another opportunity to see what all the fuss is about.

JUST FLIGHT VIDEO

At London's prestigious ECTS show recently, flight simulation software experts Just Flight were showing off all their latest add-ons and they certainly did their best to upstage the competition. Not for them a few ropey old screenshots of FS98 aircraft on a sheet of cardboard – no, sir! They commissioned a professional demo video of all their latest programs for the show. We were suitably impressed to see flight sim action on the big screen and asked if we could include it on a cover CD. Never wishing to pass up the opportunity of some free publicity, their sales director, Roger Large, let us have this video for a small consideration. None of the 'footage' has been doctored and it was all shot 'in-game'. This could be the shape of sims to come!

IMPORTANT - TECHNICAL SUPPORT

The CD and software on it is free and as such, neither PC Pilot, nor any of the publishers or developers of the software supplied on the CD can provide technical support. The software is supplied very much 'as is' and without support. Enjoy the CD and the software on it!

WANT TO RACE?

Win a copy of Xtreme Air Racing

The adrenalin junkies at Victory Simulations have taken the trouble to give us ten copies of Xtreme Air Racing for our second competition this issue, so why not send us an entry and see if you can win yourself a slice of some wild airborne action. We've all had a great time in our offices watching each other struggle for a podium finish, and the arguments over tactics and racing etiquette are still raging… See for yourself how addictive it gets.

HOW TO ENTER

All you have to do is correctly answer the following questions:

1) You can get a quick performance boost in XAR with:
   a) Nitrous oxide
   b) Hydrogen peroxide
   c) Nitrogen dioxide

2) The last Reno National Championship Air Races were held in:
   a) 1999
   b) 2000
   c) 2001

3) The course marker pylons in Xtreme Air Racing are how high:
   a) 75 feet
   b) 50 feet
   c) 100 feet

As usual, the competition is open to PC Pilot readers around the globe, with the exception of PC Pilot staff (and their butlers, gamekeepers etc.)

You can send your answers by e-mail to comps@pcpilot.net. or on a postcard/ back of an envelope to:

PC Pilot Limited
PO Box 11
St Ives
PE27 3GW
United Kingdom

Please make sure you include your full name, address and email address (if applicable). Closing date is 31st January 2002, and we won't be able to accept any entries received after that date. As always, prizes will be drawn at random from the correct answers received.

A real one – owned by The Old Flying Machine Company

Combat Jet Trainer

TLK-39C & L-29ZA Albatros

A highly detailed Albatros cockpit. As good as anything from 'The West'

Of course you don't get wafers with it!

The traditional route to publishing a piece of leisure software is for a team of developers to approach a publisher (usually a company with a nine-figure turnover) and present them with a 'good idea'. Harry Potter and David Beckham competing on The Weakest Link is the sort of thing that usually gets publishers digging deep into their sporrans. If the publisher likes the 'good idea' they usually advance the developers about £500,000 and expect the game in six months. Once the developers have consumed £750,000 worth of Coke and pizza (this normally takes about two years), a highly bugged, outdated game is rushed out by the publishers. The developers, now bored with their great idea, move on to other things. The publisher shakes his head, sells 650,000 copies worldwide and then moves on to the next game on the list. However, it doesn't have to be this way! Things are generally more sensible in flight simulation and many products start life as highly successful freeware or shareware that is downloaded and refined well before being selected for stardom by a commercial publisher.

One such product in this category is Combat Jet Trainer, developed by Captain Simulators, which is soon to be published in 'boxed' form by Just Flight. Captain Simulators number ex-Ukranian Air Force personnel among their number and have developed a highly impressive version of the Albatros trainer for Flight Simulator 2000. The Albatros was the backbone of the Soviet Air Force's training programme for many years and the software for this simulated version was based on code developed by the Ukranian Air Force for pilot training.

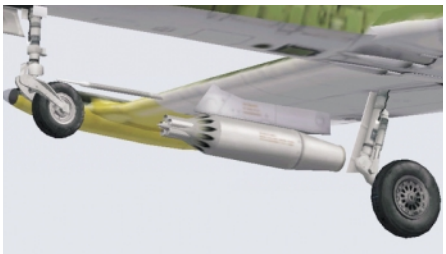
Is a trainer likely to be very exciting, and will it appeal to the mass market? Well, the answer is probably to ask the Red Arrows who seem to have a relatively exciting time with the RAF's jet trainer, the Hawk. Just Flight are planning to release Combat Jet Trainer with compatibility for Flight Simulator 2000, 2002 and Combat Flight Simulator 2, including missions for the latter platform. We took a look at the download version that's available from the developer's website www.captainsimulators.com and found it to be an excellent aircraft. There's often much criticism of fast jets in Flight Simulator, mainly because of the difficulty of getting flight models correct. However, the download version seems very competent and Just Flight have told us that they'll be making sure it performs as realistically as possible.

The published version will include scenery of Konotop Air Force Base in the Ukraine, plus the relevant charts as HTMLs on CD or possibly in the manual. There should be a number of liveries, including Ukranian and Soviet Air Forces, plus a US Navy 'aggressor' version for the Combat Flight Simulator 2 missions, which will be based on authentic fighter pilot training missions.

This sounds like it's going to be an exciting package with a very original twist and it's got to be one of the most unusual things to travel west now that the Cold War has thawed out.

Derek Smalls

The frightened instructor ejected and, unexpectedly, we were solo after three hours!



Training for combat means training with the weaponry as well as the plane

PREVIEW

Publisher:	Just Flight	**Price:**	£24.99
Website:	www.justflight.com	**Expected Release Date:**	
Developers:	Captain Simulators		Early 2002

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Flight Simulator Add-ons

767 Pilot In Command (Wilco Publishing)

767 Pilot in Command gives desktop pilots a series of nerve-wracking lessons in the art of managing aircraft problems ranging from tire blow-outs, Slocked gears and windshear to electrical failure, cabin depressurization and engine trouble.

£22.95 - €36,94

747 - 400 Pro (Phoenix)

From the developers of the incredibly popular Concorde expansion and Boeing 777-200 PRO for Flight Simulator comes the most realistic aircraft ever to fly in Flight Simulator 2000.

INCLUDES FREE VHS (PAL) 60-MINUTE COCKPIT VIDEO. EXCITING AND INFORMATIVE VIDEO FROM THE FLIGHT DECK OF A CATHAY PACIFIC 747-400 AS IT FLIES FROM LONDON TO MAKE IT'S LANDING AT HONG KONG'S NOTORIOUS KAI TAK.

£28.99 - €46,85

Greatest Airliners 737-400 (DreamFleet 737-400) Just Flight / Flight One

With a high degree of functionality and realism, Greatest Airliners – 737-400 is the most complex, yet fun aircraft package ever created!

£16.64 - €27.27

German Airport 1 (Aerosoft)

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£24.50 - €39,42

Airport 2000 Vol. 3 (Wilco Publishing)

The long awaited Airport 2000 Vol.3 has finally landed !7 new airports, 3 new aircraft and 10 adventures fully compatible with prior volumes.

£26.00 - €41,89

Captain Speaking (Just Flight)

Bilingual ATC can be chosen during installation. English, American/English, German and French ATC languages are available. With over 22,000 different voice recordings, varied weather and holding patterns, the flight conditions are different every time.

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Aiport 2000 Vol.1 + 2 :	£ 28.99 - €46,85	Proflight 2000 :	£ 24.06 - €39,42
FS Design Studio Pro :	£ 44.50 - €71,64	Private Pilot training :	£ 22.55 - €36.94
FS Clouds :	£ 19.52 - €31,98	Château de la Loire :	£ 18.91 - €30,99
Corporate Pilot :	£ 22.55 - €36,94		

and much more at : www.simw.com

Civilian Simulators

Microsoft Flight Simulator 2002 PRO (Microsoft)

Microsoft Flight Simulator 2002 Professional Edition introduces many exciting features, including interactive air traffic control (ATC) and auto-generated scenery, plus challenging new aircraft and stunning visual enhancements that truly make Flight Simulator 2002 Professional Edition "As real as it gets."

£ 52,79 - 86,50 Euro

X-Plane 6.x (Laminar Research)

X-Plane uses blade-element theory to simulate almost any aircraft conceivable... just enter the dimensions of the aircraft that you want to fly and go flying!

£43.95 = €69,16

ATC Simulator	£44.95 - €74,12	Elite v6	Price on request

Military Simulators

FlashPoint : Status Quo 1985 Bohemia Interactive (UbiSoft)

Complete infantry, mobile armor and aircraft in one single tactical game with full immersion.

£30,17 - €49,33

PBY-5 Catalina (Abacus)

The "Princess of the Stars" is the Catalina #21996. The ASCENDANCE team has mastered special techniques including shining landing lights, silky-smooth landing gear motion, working wipers and fully functional custom instrumentation. Compatibel with FS 2000 and CFS 2.

£23.95 - €38,42

B-17 Flying Fortress II (Microprose)

The complete WWII strategic airwar simulation with 10 roles on board with real time motion captured characters. Breathtaking air combat sequences over the highest resolution terrain ever seen.

£25.57 - €41,89

IL-2 Sturmovik	price : TBA	F/A 18 (Jane's)	£19.50 - €30,99
Combat Flight Simulator 2	£27.50 - €44,37	Pearl Harbor (CFS2)	£22.55 - €36,94
Battle of Britain	£28.99 - €46,85	Combat aces	£22.55 - €36,94
Harrier Jump Jet (CFS 2 & FS 2000)	£21.50 - €34,46		

Train Simulator Add-ons

Train Simulator (Microsoft)

There is a magic and mystique about trains that is difficult to explain...

£ 37.75 - 61,73 Euro

Eurostar Included !

Train Sim Roundhouse (Abacus)

New and Exciting Locomotives - diesel and electric!
New Passenger Cars to add to your locomotives
New Freight Cars as well.
New Routes for you to explore

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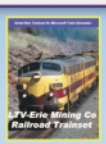

LTV-Erie Mining Company Trainset (Abacus)

These mighty railroads were used to move 8,000 tons of iron ore !
The menand woman who worked on the LTV/EMC line were in business for the "heavy haul" for parent company LTV Steel Mining Corp.

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Flight Controls

Full Control System X-45 (Saitek)

Fully programmable control stick & Throttle.

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ACP (Aerosoft)

More than 50 functions for this compact radio stack. Compatible with FS98/FS2000/Fly/Flight Unlimited 3/ProPilot/Airline Simulator.

NEW ! Compatible with X-Plane

£182.99 - €294,99

GF-AC Cockpit Control System (Go Flight)

Fully compatible with Microsoft Flight Simulator 98, 2000, 2002 and Terminal Reality's Fly! II

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CH Flight Sim Yoke (CH Products)

Ergonomic designed yoke movement without a center detent allowing the ultimate in control. Programmable through software.

PC (1 lever) : £98.19 - €160,88

USB (3 levers) : £119.37 - €195,59

AFCS (AETI)

Compatible with all simulators, this yoke is probably the most realistic on the market. High quality steel and aluminum construction & components.

£460.00 = €741,20

HOTAS Cougar (Thrustmaster)

The most realistic flight simulation controller is here. The HOTAS™ Cougar - life like in design, life like in performance. Based on the actual controller found in the F-16 fighter aircraft, the HOTAS transports you to the furthest reaches of FlightSim technology.

Special offer : £240.40 - €393,90

CH Pedals	£57.34 - €93,95	CH Pro Pedals USB	£105.76 - €173,28
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Special prices for full configurations. Please contact us or check our website !

Accessories

P 8000 (Saitek)

P8000™ can be used on your lap or desktop - which makes all your web-browsing, office and gaming needs incredibly easy and lots more fun. You can visit your favourite website at the touch of a button, simple gameplay with instantly recognisable commands and for applications, format a whole document with a single button press.

£45.24 - €74,12

SIMCharts (Jeppesen)

Edit and print worldwide charts (14 different areas)

SPECIAL OFFER

£12,15 - €19,90

Game Commander 2 (Mindmaker)

GC is a voice command input application that takes you to the next level of PC gaming. It saves you from the myriad of awkward keystrokes used in today's sims by assigning voice commands to them. You want your troops to attack? Simply say, "Attack!"

£30,11 - €49,33

Videos & Books

Cathay Pacific 777-200 ITVV - Just Flight

Flight from Auckland, New Zealand to Singapore.

£ 22.59 - 36,94 Euro

Boeing Glass 737 (300-400-500) Simulator Checkride Survival Manual

The best glass 737 procedures manual available on today's market.

£ 35.63 - 58,25 Euro

Airtours A330-200	£ 22.59 - €36,94
GO B737-300	£ 22.59 - €36,94
British Airways Concorde	£ 30.17 - €49,33
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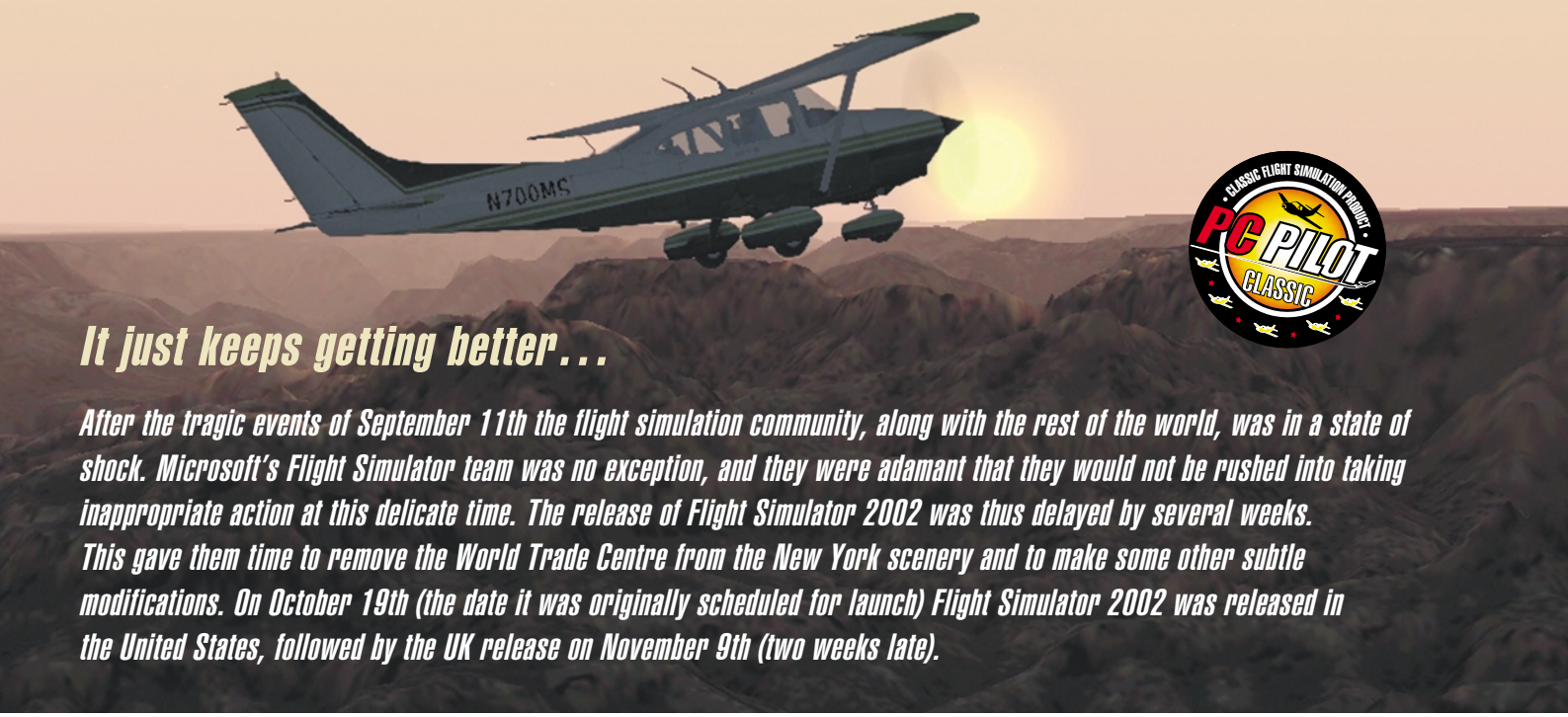
Flight Simulator 2002



It just keeps getting better…

After the tragic events of September 11th the flight simulation community, along with the rest of the world, was in a state of shock. Microsoft's Flight Simulator team was no exception, and they were adamant that they would not be rushed into taking inappropriate action at this delicate time. The release of Flight Simulator 2002 was thus delayed by several weeks. This gave them time to remove the World Trade Centre from the New York scenery and to make some other subtle modifications. On October 19th (the date it was originally scheduled for launch) Flight Simulator 2002 was released in the United States, followed by the UK release on November 9th (two weeks late).

The advancements made in Flight Simulator 2000 were unquestionably impressive, but they came at a huge price. Only the fastest PCs were able to run it smoothly, and even now many of us are struggling to keep the stuttering graphics at bay. With a plethora of new aural and visual treats in store for FS2002, we were naturally concerned that it might run like a dog. One of our review PCs is a 550MHz Pentium III and hardly the fastest kid on the block (donations welcome!), but it remains a stalwart performer. So when we loaded up FS2002 for the first time we were conservative with the graphics settings and were frankly astonished by the smooth flying that ensued.

Silky smooth

One major improvement is the frame rate lock introduced in Combat Flight Simulator 2 to ensure any instances of stuttering are drastically reduced. This is not just a minimum, but is also a maximum, and allows the computer to better allocate resources to other activities such as flying other aircraft, sound, force feedback and so on. Ultimately this results in a consistent frame rate that doesn't jump around willy-nilly, and a flying experience that is silky smooth. On the 550MHz not-so-mean machine we can set the details levels to medium and maintain a lovely 15 fps at all times. While this doesn't sound particularly stunning, 15 fps in FS2002 is as good as 30-40 fps in FS2000, and we're already a very happy bunch of PC pilots. To see the effect of graphics settings on a variety of PCs, take a look at the Silky Smooth? box.

Hey, good-lookin'!

The amazing thing about FS2002 is not only that it runs so smoothly, but that it looks so much better than its predecessor in every department. The biggest changes have come in the scenery engine that uses DEM (Digital Elevation Mapping) technology to produce rolling hills and ragged mountains. While the terrain resolution varies from region to region, higher quality add-on scenery is already appearing on the web - try www.avsim.com as a first port of call. Coupled to this is a huge improvement in the quality of terrain textures. The ground looks incredibly organic and, as you look out towards the horizon, there's absolutely no evidence of any tiling at all.

Gone are the horrible drawn-on roads and rivers from FS2000; these are now blended seamlessly into the landscape, although they can appear slightly pixellated around the edges. This terrain texture blending is also hugely improved around airfields. No longer are airports sitting atop bright green polygons hovering over the textures below; instead they nestle snugly amidst the surrounding landscape. Indeed, grass airstrips can be particularly hard to spot on a crystal clear day, just as they are in real life.

Keep your eyes peeled, as even Heathrow can be hard to spot blended into the landscape of West London

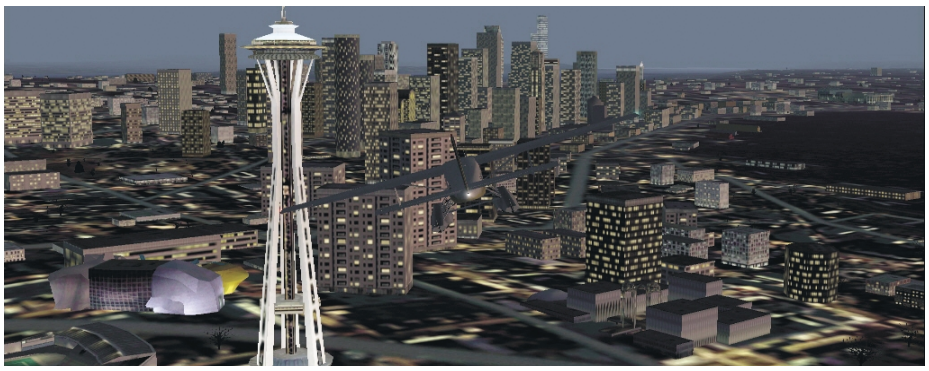
The delights of AutoGen

While the underlying terrain looks massively improved, the most revolutionary visual enhancement is AutoGen scenery. This much touted feature transforms the usually barren landscape into one bursting with buildings and trees to great effect. The idea is simply to place generic 3D objects where appropriate, so cities become crowded conurbations stacked full of houses, blocks of flats and offices, along with city-specific scenery that has always been included. Flying over London is a

spectacular treat. Taking off from City airport we can see the Thames flood barrier, Canary Wharf, and the Houses of Parliament. Even the Millennium Dome is there, albeit in the wrong place (unless the Microsoft team know something we don't about the refurbishment of Waterloo station). What is amazing is that these historic landmarks sit amongst literally hundreds of other buildings, making the cityscape more lifelike than we ever thought we'd see in a PC-based flight simulation for many years to come.

Journey out to the countryside and you'll find trees liberally scattered across hillsides. Several airports have been given a makeover too, with our own Heathrow now looking distinctly recognisable. It may not be up to the level of detail in some dedicated third party add-ons, but it isn't far off. Straight out of the box, FS2002 provides by far the best scenery of any PC flight simulator bar none. It's even better than the excellent Flight Unlimited III, and that only covered the area in and around Seattle.

Another area which has had a major revamp is the ocean. Microsoft has gone all out to improve the water effects, even employing an oceanographer as an adviser. The coastlines are now more accurate and natural in their appearance, with animated water to lap up against them. Waves break across the sandy beaches and the water shimmers in a sea-



Don't forget to pop in and tell Bill Gates how impressed you are while you're visiting Seattle

Cocktail time - beautiful sunsets in FS2002

Arriving at Innsbruck for some skiing

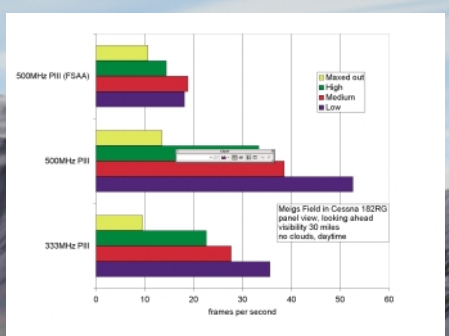
sickening way. Flying out into the sunset is an awe-inspiring experience with the sunlight glinting beautifully off the water's surface - the screenshots just don't do this justice. The subtle dynamic lighting is beautifully executed, with clouds and mountains casting eerily lifelike shadows over the ground.

SILKY SMOOTH?

To our great relief, Flight Simulator 2002 runs like a dream compared to its forerunner. The frame rate lock ensures consistent performance without any stuttering, resulting in fluid flight throughout. To get the most from FS2002 you'll still need a powerful PC, though. Anything above an 800MHz processor should yield a consistent 20 fps with maximum detail level, resulting in a wonderfully smooth flying experience.

Our hardware guru, Greg Gott, saw a silky 28 fps on a 1.33GHz Athlon with a Voodoo 5 card with full screen anti-aliasing and all detail levels set at maximum. The chart shows the comparative performance at different detail levels on lesser 333MHz and 500MHz Pentium III PCs with 256Mb RAM and a 32Mb Geforce2 MX graphics card. This is while sitting on the runway at Meigs Field with the default 2D panel showing (frame rates in flight tend to be about 30% lower than those shown). We can clearly see that anti-aliasing kills performance drastically, but that medium to high detail levels provide acceptable performance on even the 333MHz PIII system.

As always, lowering the visibility to 10-20 miles can greatly improve performance, as can lowering the Mesh Density level. Our advice is to play around with the detail settings to find out what works for your particular system - the effort will be well worthwhile with this beautiful simulator.

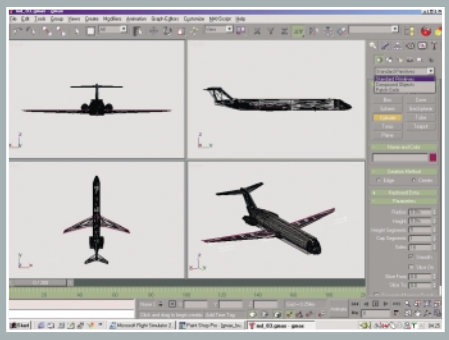


PROFESSIONAL OR STANDARD?

Flight Simulator 2002 comes in two versions, Standard and Professional, with the latter costing around £20.00 more. For starters, this buys you a few excellent extra planes: Beech Baron 58, King Air 350, Cessna Grand Caravan and the Mooney Bravo, which are all great flyers and as good as any third-party add-ons on the market. For multiplayer fans the Instructor Station allows one player to monitor a student's actions, and even fail their instruments if the mood takes them.

The inclusion of the Flight Dynamics Editor and gMax object designer are a must for those who want to experiment with creating their own aircraft and scenery.

Owners of FS2000 should definitely go for the Professional version, as the £15.00 rebate means it effectively only costs five pounds more than the Standard. For those new to Flight Simulator, the Standard version has plenty to offer, but the Pro version is great value if you can afford it, and provides the opportunity to tweak aircraft to your heart's content.



Enter the world of aircraft design with the Flight Dynamics Editor and gMax modelling tool

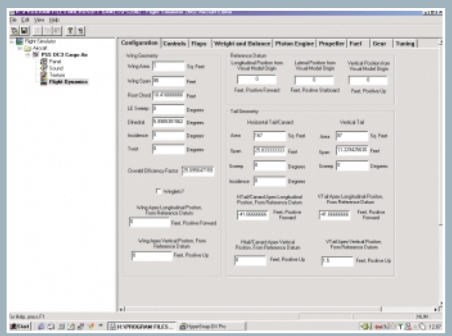
The Beech Baron 58 is a beautiful plane to take ownership of

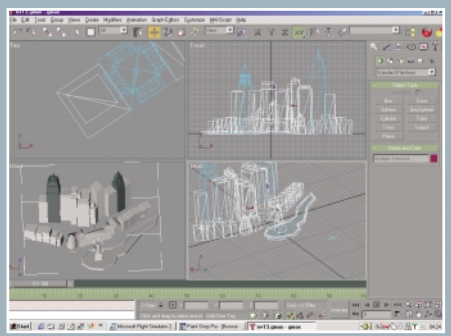
TWEAKER'S TOOLKIT

A major difference between the Standard and Professional versions of Flight Simulator 2002 is the inclusion of the aircraft FDE (Flight Dynamics Editor) and gMax modelling tool in the latter. The FDE is much improved, better structured, and is easier to use, but the most exciting addition is Discreet's gMax. A cut-down version of the extremely expensive industry standard 3D Studio Max, gMax allows you to create and customise aircraft and buildings using a truly professional package. It's not the easiest to get to grips with, but that's due to it's underlying power and flexibility.

The ATC support has real potential, far more so than the Adventures in previous versions. We can't wait for the first regional voice packs, and for other ATC-based products. There's no doubt that this is the most expandable simulation yet. Let the add-ons roll on!

gMax looks complicated... because it is. But it's an awesome tool that can deliver pixel-perfect results





Aeronautics for beginners. Try your hand at rolling your own with the Flight Dynamics Editor

The Caravan Amphibian

There's a good reason for taking all this time over aqueous endeavours. A major new addition to the FS hangar is the Cessna 208 Caravan Amphibian, a seaplane that is a whole heap of fun to fly. Jumping into the Amphibian in the harbour leaves you bobbing on the water, and taxiing isn't quite as easy as on terra firma, especially if the wind is getting up. Gunning the engines and slowly rising out of the water is an exhilarating experience; water sprays everywhere as you bounce along the surface until you eventually break free and soar skywards. Flying the Amphibian is a joy; it has plenty of power and all mod cons. The cockpit is rendered nicely and, with anti-aliasing turned on, it's superbly sharp.

The standard 2D panels in all aircraft have fully functional knobs and buttons, and additional support for mouse wheels is a real boon. Position the cursor over the autopilot or radio frequency selector and you can roll the mouse wheel to turn the dials. This may seem like a trivial addition, but it's an absolute gem when you're flying, and you'll soon wonder how you ever lived without it.

3D virtual cockpit

Another new highlight is the 3D virtual cockpit, which we're sure will become the default view for enthusiasts everywhere. The pilot's office has been recreated in glorious detail, but the most important addition is fully working instrumentation. The gauges and dials all work correctly, although unfortunately they're not interactive in this view. Using the virtual cockpit zoomed out to 0.50-0.75 provides a far more realistic field of view than the normal 2D panel view, and allows you to pan around to enjoy the view. A downside is that extra windows such as the GPS and radio stacks can only be brought up in 2D pop-up windows, which does spoil the illusion a little. Still, the virtual cockpit is a huge improvement over the flat panel view that we've been used to for so many years.

Fully interactive ATC

Being able to look around and scan the skies is more than a cosmetic luxury in FS2002. By far the most significant addition is the fully interactive Air Traffic Control engine, complete with skies full of computer-controlled aircraft of all shapes, sizes…and pilot ability. Some of the most popular add-ons for previous versions have been those that added ATC capability in the form of Adventures. Microsoft received some criticism for not including ATC in FS2000, and they claimed that they weren't going to add it until they could do it right. Well, they've gone in to bat two years later and hit a six with an incredibly complete and immersive air traffic environment.

Ladies and Gentlemen, here we go…

We just love to fly that seaplane - the runways are so long

It's now easier than ever to create a new flight; the startup screen allows you to choose an aircraft, starting airport, weather conditions, season and time of day. From here you can also customise your system settings before launching the simulation proper, which saves loading time. You can customise your aircraft's airline, call sign and tail number, all of which will be used by ATC controllers. The Flight Planner allows you to select starting and destination airports around the world by name or ICAO code, and to generate a route between them. You can specify a direct route, or one using low altitude or high altitude jetways, or VOR to VOR. This you can file as a full IFR (Instrument Flight Rules) flight plan, or as a VFR (Visual Flight Rules) plan for loading into your navigation computer. Once this is done, simply click the Fly Now! button and you're transported to your waiting steed.

Virtual cockpits are the way to go; the 737's is wonderful

Taxiing made simple

If you asked to be positioned at the departure gate then you'll need a pushback, but first you'd better contact Clearance

Out of my way, big boy!

Phew! Rush hour gets worse all the time round here

Keep your eyes peeled - there's plenty of traffic out there

Delivery to file your flight plan with the authorities. After checking the ATIS (Automated Terminal Information Service) for weather information, it's then time to ask the ground controller for permission to taxi. This is all done through the ATC window, a translucent, re-sizeable pop-up window that displays the various radio messages you can transmit. This is activated using the ['] or [Scroll Lock] keys, not the [Shift]-[`] key as indicated in the manual – at least not on our UK keyboard. Once you've been given permission to taxi you can pushback using [SHIFT]-[P], followed by the [1] or [2] key to pushback to the left or right. You have to remember to hit [Shift]-[P] again or else you'll end up in the terminal building. There's no radio support for pushback operations, so this is not as realistic as some add-ons we've tested, but this is a relatively minor irritation. You'll be given detailed taxi instructions, but if you're unfamiliar with the airport layout then you can ask to be shown the way to the runway. Progressive taxi instructions take the form of a large pink ribbon that extends along the appropriate taxiways, making airport navigation a breeze.

Beware of the traffic

At this point you'll probably encounter other aircraft, depending on how much ATC traffic you've selected in the ATC options screen. At a busy airport such as Heathrow you'll not only see other airliners on the tarmac and in the surrounding skies, but you'll also hear them on the radio. This is where the true depth of the ATC system becomes apparent. As you taxi along and another aircraft looks worryingly close to jumping across your path, you'll hear the ground controller tell the other pilot to hold short of the taxiway until you've passed. Of course, you can be halted too, and while it may take a little longer to reach the runway, the satisfaction of getting there is increased beyond measure. Take too long with your checklists and by the time you reach the holding position by the runway there will be a queue of traffic that you'll have to sit behind before you can take off. How realistic is that!

Clear take-off

Waiting in the holding position, it's time to contact Tower control and get rolling, although sometimes you'll have to wait for an aircraft on finals to land before you can take to the runway. If all this sounds too troublesome for the impatient, then you can turn off ATC-controlled traffic completely for a clear run. We do like to see some traffic, but not enough to delay us for too long, so it's just a case of turning the slider to the right setting. If only this was possible in real life – but that's the beauty of Flight Simulator.

Once you're cleared for take-off, then its up,up, and away. For an IFR flight plan you'll be handed over to Departure Control and given instructions all the way to your destination. For VFR flying you can request Flight Following so that ATC keeps track of your whereabouts and can warn you of nearby traffic - there are usually plenty of AI-controlled aircraft scattered around the skies which you'll have to contend with. The controllers are good at keeping tabs on the traffic and will ask you to report sightings of other aircraft in your vicinity. This is where the virtual cockpit comes into its own, allowing you to scan the skies for telltale red and green strobe lights. To make life easier you can turn on text labels so that you can see the location and the tail numbers of the aircraft from the cockpit.

There's an excellent radio AutoTune feature that automatically sets up the radio as you're handed from one controller to the next; this is invaluable, otherwise keeping track of radio frequencies can be strenuous for the new pilot. After all, that's what co-pilots are for. For the hardcore enthusiast a tap on the [F10] key calls up a kneepad, where you can note down radio frequencies and ATC instructions. Also on the kneepad are aircraft checklists, aircraft technical information, and a keyboard quick reference diagram. Tuning the radio stack is made much easier using a mouse wheel, and support for switching between primary and secondary frequencies has finally been included.

Once you get near your destination airport you'll be given vectors to intercept the ILS (Instrument Landing System) and also given the option to execute a visual approach if you're feeling confident. If you're coming in at rush hour then it's likely that you'll have to join the back of the queue, and ATC will inform you of what number you are in the landing order and which aircraft you're following. While the AI-controlled aircraft are generally well behaved, be vigilant, as sometimes a plane can be slow to clear the runway or will stray dangerously onto the tarmac, forcing you to execute a missed approach. It doesn't happen often, but it demonstrates the depth of the ATC system. We were amazed when this happened to us for the first time, but now we accept it as much as real-world pilots have to.

We've seen the ATC system in previews of FS2002, but only after flying the friendly skies for many hours do you realise what a difference it makes. On its own it's a solid reason to upgrade to FS2002. It's not perfect though; you can't request different altitudes en route; published DPs (departure procedures) and STARs (Standard Terminal Arrival Routes) aren't pre-programmed, and failed radio equipment isn't handled by ATC. What really excites us is the prospect for ATC-based add-ons though, which will surely fix these omissions. The most significant drawback is the inclusion of only ten different ATC voices - all American, of course. This provides enough variety to make it realistic, but is out of place when flying in Europe and other parts of the world. We're sure that voice packs will be released in due course, and we can't wait to try them out as they'll surely add yet more depth to what is already an incredibly immersive environment.

Stay up above 30,000 feet and everyone can see you

A default Jumbo at last!

One of the most featured add-on aircraft for Microsoft's Flight Simulator is the legendary Jumbo Jet. After many requests, Microsoft has included this as a default aircraft on both Standard and Professional versions of FS2002. Having worked closely with Boeing, the aircraft both looks and feels very authentic - at least, as far as we can tell, having never flown a 747-400 ourselves. The closest we've ever come is Aerowinx's ultra-realistic Precision Simulator 744, and FS2002 doesn't feel too far away from that. Microsoft's Jumbo feels incredibly smooth to fly, but with a tremendous amount of inertia. You definitely have to stay three steps ahead here, but if you keep your cool then it's surprisingly easy to handle. The feeling of sheer size is accentuated when sitting in the cockpit some 35 feet above the ground. The field of view feels right, and turning on the taxiing and landing lights at night conveys the sense of height well. Steering this behemoth around airports is a challenge in itself.

747-400 King of the Skies comes to Flight Simulator 2002

HANGAR TIME

The aircraft in FS2002 are all stunning supermodels both inside and out. The addition of the gigantic 747-400 will please many, as will the inclusion of the diminutive Cessna 172 Skyhawk, every bit as famous as the mighty Boeing. The Cessna 208 Caravan Amphibian provides some fantastic waterborne action.

The Professional version of FS2002 includes two new aircraft: The sleek Beech Baron 58 is a wonderful classic that is reproduced beautifully, and the Cessna Grand Caravan is a trusty workhorse that will certainly get you where you're going without too much fuss. The King Air 350 and Mooney Bravo are also only available in the Professional version, and are both worthy additions to the collection.

Ready to get your feet wet in the Cessna 208 Caravan Amphibian

The Beech Baron 58 - a favourite with discerning aviators

The venerable Cessna 172 Skyhawk is familiar to pilots worldwide

The Bell 206B Jet Ranger is easier to fly than its predecessor

Cessna 172SP and Beech Baron 58

Another key addition in the aircraft hangar is the Cessna 172SP. Not as swish as the 182 Skylane, the 172 Skyhawk is nonetheless a familiar site at every airfield and is comfortably familiar to almost every pilot throughout the world. The rendition in FS2002 is amazingly detailed inside and out, and sounds utterly realistic. The development team went the whole hog with the Cessna, placing microphones all over a 172 at their local airfield to record the sounds. Just try sitting on the tarmac and turning systems on and off for some aural indulgence. Externally, this is one of the most detailed aircraft in the inventory, and every rivet and oil stain is clearly visible. At night the strobe lights on the Cessna and all the other aircraft glow extremely realistically, lighting up the aircraft surface perfectly. To help the pilot, landing lights shine down onto the ground in a perfect cone that makes judging when to flare just as easy as in daylight. On larger airliners the separate taxi lights even move with the front wheel steering, illuminating the taxiway ahead. Awesome.

The Beech Baron 58 provides a luxurious twin-engined experience for any pilot, and is one of our favourite default aircraft. As with the other planes, the flight models have been improved and are also helped by the smooth graphics. Flying is a lot more fluid now, and the option to download real weather (now including winds aloft) makes for some satisfying flying. We found that it's well worth experimenting with the controller sensitivities and null zones to suit your joystick setup. This is especially true for the Bell helicopter, which on our first attempt was as difficult as ever to fly. Lowering the sensitivity and null zone, particularly for the rudder axis, turned it into a well-behaved craft.

Third party add-ons and compatibility

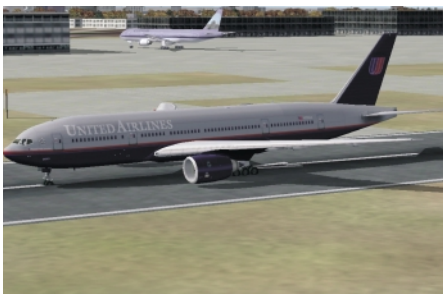
If these aircraft aren't enough then there is, of course, a wealth of third party add-ons. Compatibility with any new version is always a big question, so we tried out a few of our favourites to see how they worked with FS2002. Most freeware aircraft seemed to work perfectly, and we downloaded some superb repaints of the default aircraft. Jump Jet worked well, but Flight One/Dreamfleet's 737-400 Greatest Airliners add-on was a disaster, bombing us out to the desktop. This wasn't unexpected though, as Flight One and Just Flight will be sending out a CD patch soon. We had more success with Phoenix Simulations 777-200 Professional; after following the detailed instructions at www.avsim.com/pss/products/pss777fs2002.txt it ran perfectly - well worth the five minutes of fiddling. Just Flight's Great Britain and Ireland scenery installed seamlessly, although the airfields sit on their customary green baize carpets, rather than blending in with the surrounding scenery as the default scenery does. On the whole, compatibility is good, with major problems only appearing to occur with add-ons that use FSUIPC.DLL. Patches for FS2002 compatibility are already coming out, however, so the future looks bright.

Where's the manual?

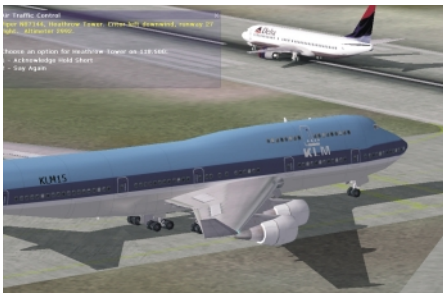
One of the major downsides of FS2002 is the rather meagre physical package that it comes in. The DVD-sized cardboard box contains two or three CDs and just a 30-page quick start guide. The documentation is actually excellent, although it's in PDF format, so you'll need an extra printer cartridge to print it all out. Having said that, it's well worth a read, and includes Rod Machado's fantastic Ground School, a 71-page ATC guide, a floatplane manual, and aircraft handbooks for all of the included planes. While it's a real shame that you have to print this out yourself, at least you don't have to download it from the Internet, as we had to with Fly!II.

After all the waiting Microsoft has delivered in abundance with Flight Simulator 2002. While FS2000 was a good upgrade, FS2002 is a must-have for virtual pilots everywhere. Take our word for it - go and buy it. You won't be disappointed. With continued support for developers, we're sure that the next two years will be a hugely exciting time for owners of FS2002. ■

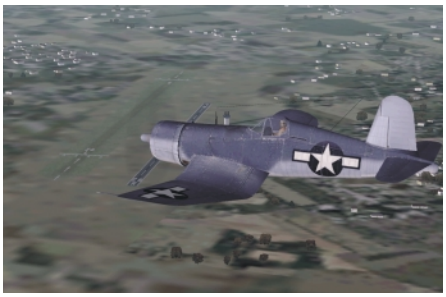
Kenji Takeda



The Phoenix Simulations 777-200 Pro crowbarred into FS2002, but looking good all the same

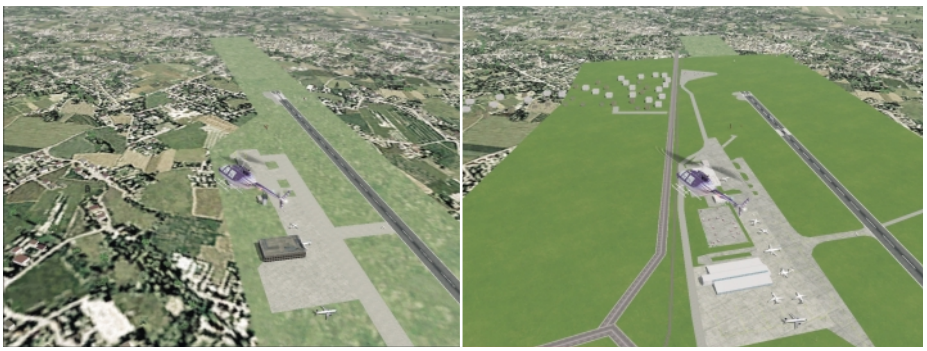


Developers are already having a field day repainting the default aircraft



Who let that guy in here? Shouldn't he be in Combat Flight Simulator 2?

The interactive 2D panels are crystal clear, and with mouse wheel support for those dials too



The default version of Southampton International lacks detailed buildings, but is well hidden in the landscape. GB and Ireland add-on works well, but sits on a baize carpet that stands out like a sore thumb

REVIEW SCORE:

Publisher & Developer: Microsoft **Release Date:** Out now

Price: Professional version £69.99 (£15 rebate available). Standard version £49.99 (no rebate) - look around and you'll find some serious discounts on these prices

Website: www.microsoft.com/games/fs2002

At a glance: Some stunning features - ATC, AutoGen scenery, seaplane operations, virtual cockpits and awesome graphics make this a must-have, and developer tools make the potential for add-ons as exciting as ever. On the downside, PDF documentation is a pain; there's no rebate on the Standard version, and virtual cockpits are not fully interactive.

SYSTEM REQUIREMENTS: 300MHz CPU, 64Mb RAM, (Windows 98/ME), 128Mb RAM (Windows 2000/XP), 4x CD, 8Mb 3D accelerator video card, sound card, joystick, throttle, rudder pedals, mouse, keyboard

RECOMMENDED: Pentium III 600MHz, 256Mb RAM, 32Mb 3D accelerator card

A second (and third!) opinion

Looks like there's a storm brewing

As you'd expect with a product as complex as Flight Simulator 2002 we've tried to make our review as objective as possible and canvassed the views of some other PC Pilot writers. Greg Gott and Joe Lavery gave us their first impressions of Microsoft's new sim.

Hardware expert Greg wrote: "Flight Simulator 2002 has been a part (a good part!) of my life for nearly two weeks now, and with it is a dilemma. I can't seem to shut down the system and take care of the rest of my life. It is, from my backyard, the finest simulation ever to dwell on my system's hard drive. What makes it so? Gorgeous scenery, stable aircraft, stutter-free performance, Air Traffic Control, a much improved instant replay mode, functional virtual cockpits, busy airports and airways, possible mid-air collisions, to name a few. There are bugs, make no mistake, but the good far outweighs the bad.

"Now, this perspective comes from using a 1.33GHz Athlon system with 256Mb of DDR-SDRAM and a Voodoo5 graphics card. If you wonder whether this kind of muscle is required to enjoy FS2002, here are some specs from a somewhat slower system, an 800MHz AMD Duron, with a GeForce2 MX 200 graphics card and 256Mb of PC133 memory.

"The readings were taken at 1152 x 864 resolution, with all dynamic scenery disabled, all others at maximum. The 'Chicago video' is a 1 minute recorded flight along the Chicago skyline, looking west from the 'spot view' of the Cessna 172.

FLIGHT	1.33Ghz	800Mhz
Default Meigs (cockpit view)	45 FPS	29 FPS
Default Meigs (spot view)	28 FPS	19 FPS
Chicago Video	28 FPS	21 FPS

"The key element which FS2002 provides that FS2000 never could is a fluid flight environment. Even at 20 frames per second, it is noticeably smooth and, by reducing the demands on the CPU, one can easily raise frame rates, even on a sub-gigahertz system."

Greg Gott

The Virtual Cockpit is brilliant!

Does the spec sheet reflect reality?

Microsoft also boasts that the minimum specification for FS2002 is just 300 MHz, so we fired up an old 400 MHz Celeron to test the claim. Much to our surprise it's not that bad. Naturally we had to crank down the graphics a bit because the Celeron only had an ATI Rage Pro to motivate those pixels. Consequently, 15 frames a second was the best trade off we got between the graphical splendour it's capable of and flyability. The display settings will allow you to set a specific target frame rate, if you don't mind sacrificing even more visuals to get a more responsive flight.

Joe Lavery was also impressed: "Flight Simulator 2002 has finally arrived and I have to say at the outset that it's all that Microsoft promised it would be. They have listened to the criticisms levelled against FS2000, dumped the old code and replaced it with a product that has all the dynamics and graphic agility found in real aircraft.

"We humans are very adept at discerning the difference between what's real and what's artificial. If it doesn't look right then it probably isn't, and that has always been the problem with any simulation based on fluid movement. Without that 'believable' element you might as well be sat on a chair in front of a computer… exactly the opposite of what Microsoft are trying to achieve.

"Of course, new features like the interactive ATC, progressive taxi and automatic scenery generation all help to improve the product and maintain the illusion, but it's that feeling of ground effect you get as you float down the runway on touchdown, or the rudder input needed to overcome the prop wash on take-off that really makes the difference. When you combine these elements with a visual model that surpasses anything we've had before, then I think that perhaps Microsoft have finally got it right. Seeing hundreds of trees and buildings scrolling gracefully past the window as you take off or make an approach is brilliant. Particularly as they are rock solid models that don't suddenly pop into view as they did in FS2000. Naturally, there are still things on our wish list; for example I would love to see a more photorealistic 3D cockpit, and I'm sure we would all love to have scenery detailed down to street level, which would give VFR flying a totally new perspective, but until then FS2002 is about as good as it gets."

Joe Lavery

IL-2 STURMOVIK

Any sufficiently advanced technology is indistinguishable from magic...

"The Eastern Front has many lessons for the West of today, but they are seldom studied."
(Lt. General Johannes Steinhoff)

Absolute disbelief. That was the expression on the face of a PPL holder and avid fan of Jane's WW II Fighters when he first saw IL-2 in October. He immediately asked, "Is this just a technology demo, or is someone actually developing this simulator?"

Welcome to the brave new world of simulation technology. IL-2 Sturmovik is comprehensive, innovative and superbly constructed. It's precise, evocative, beautiful, and immersive.

IL-2 was originally conceived around the IL-2 Sturmovik, one of the best ground support aircraft of WW II. As the design progressed, so the scope became wider; now IL-2 not only simulates many unique Russian aircraft, but also adds the most popular German fighters and bombers, and even the rare Me-262 and He-162 jet fighters. It simulates both the air and ground wars, and both environments are stunning, particularly as a result of the latest developments in lighting effects. Multiplayer features have been added, as has a powerful mission builder. Roughly four years in development, IL-2 has been the obsession of a crack development team in Moscow and was finally revealed to the world in November.

The rewards of obsession

The original design goal was an uncompromising multiplayer simulation of the Eastern Front, including all those features that online enthusiasts have long dreamed of. An undemanding bunch, they want to use custom paint schemes and have diversity of choice in historical ordnance; they want accurate historical markings and the ability to design their own missions and campaigns, not to mention unique camouflage for both summer and winter, integrated voice communications, and the ability to record and play back missions. And they want all this with state-of-the-art flight and damage models and challenging and unpredictable

AI in a realistic environment with smooth online graphics. A huge challenge, obviously, but IL-2 delivers on all fronts.

You can choose from 31 different aircraft, and you'll see another 41 types in action. The flyable aircraft are:

IL-2 (nine models)
LaGG-3 (three models)
MiG-3 (three models)
La-5FN
Yak-1b
Yak-7
Yak-9T (three models)
Yak-3
P-39N-1
P-39Q-1
P-39Q-10 (all three of which are US lend-lease)
Bf-109F-2, G-2, G-6, G-6 Late and G-6AS (WEP system MW-50)
FW-190A-4

As if that weren't enough, you'll be able to fly more than a dozen other aircraft within a few months, including the Ju-87, three more variants of the Focke-Wulfe and another three versions of the Bf-109. 1C:Maddox Games has encouraged enthusiasts to build the cockpits and views, while Maddox maintains strict control over the flight and systems modelling. Some of the other aircraft seen in the simulation include the I-16 Rata, I-153, Pe-2 and Pe-8, He-111, Hs-129B, Ju-52, Ju-88, FW-189, He-162, Me-262, IAR-80 and 81, and the Macchi MC.202. There are also floatplanes such as the Ju-52 and MBR-2 and a huge variety of tanks and air defence systems. And let's not forget the ships, which include destroyers, torpedo boats and transports. Enough for you?

The team's obsession with detail shows at every level - flight models, cockpits, aircraft skins, damage modelling, voice chatter, objects and terrain. It's apparent in features such as moving waves, lightning and rain, leaking fuel tanks, stuttering engines, smoke from the wheels on touchdown, ship and torpedo wakes, lasting vapour trails, cloud shadows and individual trees. There are more varieties of visible damage than you can possibly imagine, including deflated parachutes. When watching from an external view, the AI pilot swivels his head to keep an eye on the aircraft he is engaging, and when a pilot crash-lands you'll see him running away from his aircraft.

Have we mentioned the sounds yet? Sound effects and voice chatter are excellent throughout, with support for environmental effects, 3D positioning and occlusion. It's worth mentioning that the sound of rain in the Il-2 demo was enough to cause a visitor to our offices to peer nervously out of the window. A damaged engine soon starts to sound like ball bearings bouncing around in a tin can, and variations in propeller pitch produce distinctive tones. The English version of Il-2 has Russian and German voices (subtitled on screen) but you can bet it won't be long before an English voice add-on becomes available.

A quick look over the shoulder to keep the bandit in sight

External padlock from La-5FN to Bf-109 target

Outstanding damage modelling

Live to fly another day...

Superb night lighting effects - P39 interceptor encounters a Ju-88

Engaged single 3 o'clock high

We have flown WarBirds, European Air War, WWII Fighters and Combat Flight Simulator 2, but none of these prepared us for the challenge and sheer joy of flying in IL-2; it represents the coming of age for combat flight simulations and will set the standard by which others are judged for years to come.

We hosted an online multiplayer session one evening, and invited a few fellow virtual pilots along. A simple bomber intercept mission was constructed, with six 109s flying against 12 incoming Pe-2 twin-engine bombers, escorted by a flight of four La-5 aces. With three human pilots in 109s and two flying in La-5s, the stage was set for a serious encounter…

The human 109 LEAD managed to engage a Pe-2 and sent it down in flames, and then took on an La-5. Both were experienced virtual pilots and the fight was intense, moving in both the horizontal and vertical, with both pilots achieving only snap shots through a tight scissors. Eventually the La-5 made a mistake while under 200m and ploughed into the ground. The 109 LEAD soon engaged a second La-5 and the fight was equally fierce. Having finally gained an advantage in a loop, the 109 was almost on the tail of the La-5, who had gone low and extended, when suddenly the La-5 pulled up into the clouds and the battle was back on an even footing. Eventually the LEAD shot down his opponent, only to discover that the La-5 was not actually piloted by a human at all. The AI adversary used a huge variety of complex manoeuvres, including the use of flaps to tighten the loop and to cause the opponent to overshoot. An AI pair will even use drag techniques, and AI pilots pushing the limits can lose control and spin.

This also means that your AI wingmen are smarter than usual. You can command up to 16 aircraft in single player or co-operative online mode; the command structure is what you might expect, and you are also able to communicate with ground control.

One great innovation in IL-2 is the ability to sit on the sidelines and watch other combatants fighting it out in real time. The experience is like watching aerial ballet, or full-colour WWII footage as it happens. A pilot can opt to record the action in single-player missions for later viewing, which is a great way to learn from your mistakes, or perhaps an opportunity for video training.

Play it again

A frequent issue in combat flight simulations is that once a pilot has worked his way through the missions and campaigns, there are few surprises left. Thankfully this isn't the case in IL-2; an

Bf-109 Jabo wondering what's lurking in the forest below

It's not just FS 2002 that has a floatplane

262s get ready to fight for the Fatherland

Unsuspecting shipping leaving Sevastopol Harbour

There's a time to fight…and a time to run

A flight of Polikarpov I-16s above the bleak Russian steppes

BMW rider with sidecar dreams of joining the airborne glamour boys

There's plenty to keep you busy if you get tired of aerial combat

The internal view looking downwards in a Bf-109 cockpit

online mission against human adversaries will never be predictable, and the inclusion of a full mission builder offers endless possibilities. Furthermore, the extensive maps and the great variety of aircraft, combined with the weather options, provide the combat pilot with an almost limitless selection of environments and action in which to test his skills.

As in Rowan's Battle of Britain, you can try your hand in the rear gunner's seat; while one person pilots the IL-2, another can defend from the tail. Initially this is limited to the IL-2 only but, as aircraft like the Ju-87 and Ju-88 become available, the options will increase.

View options add to the fun. For those who want immediate gratification, icons can be used to identify friends and foes on screen. If you want a greater challenge, turn the icons off. Trying to locate those pesky intruders in appalling weather is a huge challenge, but the reward for locating and downing Stukas while flying through fog and rain is equally large. Do it often enough and you can earn promotions and decorations for your virtual self.

Naturally, realism options abound. You can select an EASY, NORMAL or REALISTIC setting, and adjust individual settings such as engine overheat and stalls/spins. If you join an online session, however, these are determined by the host and you have to conform to these choices.

The padlock view is used in combat simulations to approximate the movement of the pilot's head as he tracks the target relative to his own aircraft. Whereas in most simulations the padlock view will immediately lock to an enemy aircraft, IL-2 uses an innovative system; if icons are enabled, padlock can be used to scan enemy aircraft within a distance of 3km, and if they are disabled, padlock will lock onto any aircraft within 3km, but only within the line of sight. An aircraft hidden by the wing or by a crossbar in the cockpit will not be automatically tracked. The view from the cockpit offers three different fields of vision, and other standard views are also possible - cardinal views, pan views, player-to-target views and more.

Fight and flight

The variety of flying experiences available is tremendous. The Bf-109 handles very differently to the Yak-1b, for example, and the 109 F-2 is different altogether to the G-6. Adding external gun pods to the G-6 will further change the handling, although doing so will increase its lethal capabilities. You can choose between 20mm or MK108 30mm external guns on the G-6, and even exchange the MK108 nose cannon for the MG151/20 version. These choices between weapons become critical when chasing bombers rather than fighters, but the pilot flying with heavy ordnance must be prepared for an encounter with an escort unit; the G-6 is a

Bf-109 meets La-5FN at the merge, when they could both just be enjoying the lovely sunset

The chase is on…

Ju-88 on a night bombing raid encounters opposition

deadly opponent, but when heavy it becomes sluggish and prone to spin.

The flight modelling is outstanding throughout. A flat spin in a 109 is rare, but if it happens, bail out quickly. The La-5 is a sheer delight to fly, and tough as nails when you're on her tail. The Yak 9 is fast, powerful and well armed, while the lend-lease P-39Q is quirky but dangerous.

Damage modelling in IL-2 is enough to make strong men weep. The cockpits are of a genuinely photorealistic quality, and even vary for each model of 109. All our years of PC flying hadn't prepared us for the detail in IL-2. There is no 'hit bubble'; the old hit box which extended around various parts of the airframe in earlier simulations has been replaced by realistic physics and ballistics considerations - you only 'hit' what you actually hit. The difference this makes is quite astonishing, and a wing profile at a distance of 150m is incredibly hard to hit! Issues like this make gunnery and convergence settings very important. Heed the old masters: "Get closer, then get closer still." Easier said than done when your target is doing its very best to shake you off!

When you finally see your target trailing smoke, or when you see a hole appear in his wing, you'll know you've been successful. When the canopy finally flies off and the pilot bails out, the drinks are on you! We made a note of some of the numerous damage effects we saw (mainly on our opponents, obviously) - bullet holes in every surface of the airframe, fuel, coolant or black oily smoke streaming out behind planes, and fuel dripping out of a leaking tank onto the runway. We saw holes in the perspex and in the instrument panel, broken gauges and a broken gunsight, bent and broken props, gear, and various parts separate from the fuselage, twisted and blackened metal, and fire. We noticed half rudders, half elevators and holes in flaps…we've seen it all! This kind of detail hasn't been spared on the ground objects either; we spotted tanks with blown turrets, and there are even troops who will run for cover when under attack.

Campaigns and the multiplayer world

The single-player campaign is divided into six historical 'chapters', which track your career from the steppes of Russia in 1941, to Berlin's Brandenburg Gate in 1945. Combat includes air support, ground attacks and even naval battles, and you can fly for either the Russians or the Germans as a fighter pilot, or carry bombs in the IL-2. (The 109 can also fly as a Jabo.) If you have the hardware to handle the demand, you can fly over historic Berlin. Cities are well populated with buildings, trees and even rail yards; the detail is as astounding as anything you'll find in the air, and there's never any shortage of targets.

There are plenty of advanced multiplayer features, and built-in voice chat is selectable by channels to keep your squadron co-ordinated. Ubisoft is home to the main lobby and server, but IL-2 owners will be able to set up their own server or fly on a LAN. Up to 32 combat pilots will be supported in a winner-takes-all scenario, or 16 pilots in co-operative mode (8 per side, plus AI aircraft and ground vehicles). Ubisoft's Game Service lobby is friendly, but there are other options available. Hyperlobby, http://hyperfighter.jinak.cz, which we took a look at in our last issue, is a third party lobby where pilots meet to fly a variety of simulations, of which the IL-2 demo is the latest to be added. A third party add-on available already is the IL2 Campaign Generator, (http://campaigns.il2center.com), a sophisticated freeware utility that generates campaigns based on parameters you set yourself.

The future starts here

IL-2 is not merely innovative - it's revolutionary. It surpasses expectations and is almost transcendent in conception. What more could it possibly need? It would be good to be able to use custom skins in single-player mode and the Bf-110 is a notable absence, but otherwise IL-2 really is nothing short of a combat enthusiast's dream come true. With reference to the quotation at the top of this review, we could add, "IL-2 has many lessons for the developers of today, and we hope that they are being studied." ■

Leonard Hjalmarson

REVIEW SCORE:			
Publisher:	Ubisoft	**Price:**	£30.00 approx.
Developer:	1C:Maddox Games	**Release Date:**	Out now
Website:	www.il2sturmovik.com		

At a glance: A stunning simulation featuring air and ground action in a unique theatre. IL-2 combines graphical splendour with highly detailed flight models and reliable multiplayer features. A mission builder and 31 flyable aircraft will add longevity.

SYSTEM REQUIREMENTS: PII 400MHz, 128Mb RAM, 16Mb 3D graphics card

RECOMMENDED: PIII 600MHz or higher, 256Mb RAM, 32Mb 3D graphics card

XTREME AIR RACING

Gentlemen...you have a race!

Adrenalin junkies rejoice! The Reno Air Races have finally made it to the PC. Victory Interactive has been working hard to make Xtreme Air Racing a massively exhilarating simulation of the aviation fest held at Stead Airfield every September. Take eight crazed pilots, some seriously souped-up aeroplanes and some cones laid out in the middle of the desert, and you've got a race on your hands. XAR is similar in many ways to the plethora of car racing games that have been around for ages, but is faster, higher (not much!) and a lot more dangerous. You can choose to take part in individual races, or try your hand at a three-race season, and there's also a free-flight area where you can hone your skills and test out modifications to your aircraft.

Can you handle it?

There are over 20 aircraft to choose from, all of which have distinctive characteristics, including some truly wacky paint jobs. The mighty P-51 Mustang is a popular choice among racers, with several variants available to fly, and it's not surprising that it does so well, given its monstrous engine and slick aerodynamics. If it's pure power you're after then the twin-engined P-38 Lightning looks promising, but it takes a lot of skill to keep up with the single-engined contenders. Of course, the ultimate powerhouse is the GeeBee, which is included here…but not available until you've proved your skills out on the track.

Pure airborne muscle - sounds great as well

Book early - the show's coming to town

Are you ready to rumble?

Choose from over 50 tracks or create your own using the built-in track editor

Grease monkeys welcome

Once you've chosen your racer then you can tweak the plane to eke out those extra ounces of performance. On the Bronze difficulty level, racing is pretty straightforward, but Silver, Gold and Platinum AI pilots are tough opponents, so you'll need every bit of technological help you can muster. Changing the engine obviously makes a big difference, but more subtle adjustments such as gearing ratios and propeller diameter also need attention. As in motor sports, the races last for several days, with time for practice and a qualifying session to see the effect of your tweaks in comparison to the other planes. Fine-tuning for one track is great, but moving from the desert of Reno to the Arctic fjords demands a complete rethink of your technical strategy. Unfortunately the bundled documentation is non-existent, although the README file contains good descriptions of the aircraft, and the website has several technical documents that provide great insight.

Left or right at the end of the straight?

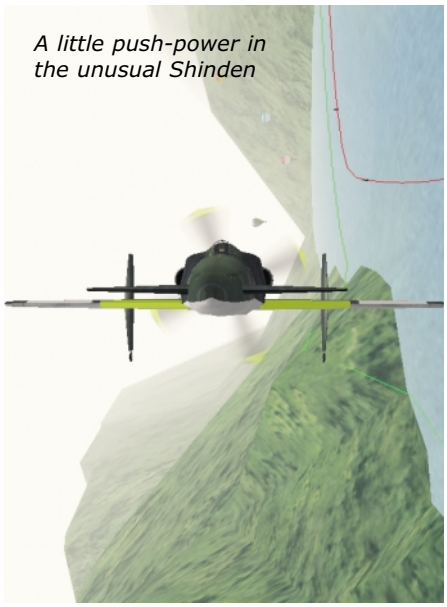
Out on the track the action is fast and furious. The flight modelling in XAR is second-to-none - this is certainly no arcade game. The planes are twitchy, strain under all the power, and respond nicely to a light touch of the joystick. Being so close to the ground is a revelation to more sensible pilots, and the pylons which mark the course are just 50 feet high. Green and red lines can be turned on to show you the ground track, with laser pylons extending all the way into the air as an extra aid to navigation.

There's also an option to display air hoops that show the optimum route to take, which is the racing line the AI pilots always try to stick to. Ducking and diving for position without straying off course and cutting pylons is a challenge for even the most experienced pilot. Miss a turn and you'll be heavily penalised (by a time penalty in seconds of twice the number of laps), which is inevitably catastrophic for your chances of winning. Just as detrimental to your championship is taking the corners high and wide. Miss the apex and you can kiss your chances goodbye as the others slide by fast and low on the inside. Adjusting the joystick sensitivities and learning how to use the rudder effectively are the keys to success.

Back off...or else!

Flying starts are the norm, with all the aircraft lined up in formation, ready to make a beeline for that first pylon as soon as the clock counts down to the start. With so many planes in such close proximity the air becomes very churned up, and XAR uses a model designed by the boffins at NASA to account for the wakes behind all the racers.

The GeeBee - this engine with wings personifies air racing



A little push-power in the unusual Shinden

Wacky Racers

With over 20 aircraft to fly there's plenty of variety for the aspiring speed freak. There are numerous variations on a theme, with the P-51 Mustang and Hawker Sea Fury being popular types - not that these are standard military issue planes by any means. All of the characters familiar to Reno's supporters are included here: Lyle Shelton's Rare Bear is a perennial favourite, along with the star-spangled Miss America and the familiar profile of the Super Corsair. Do well enough and you'll be able to unlock several other planes, including the super-powerful GeeBee, and Bob Hoover's own baby. Victory Interactive is promising new classes of aircraft in add-on packs, such as Sports Biplanes, T-6 Standard Class and the Formula One aircraft that we were able to test in last issue's Alpha version preview. With the included track editor, file upload/download and discussion forums on their website, we hope that Victory Interactive manages to foster a good community spirit around XAR to keep this exciting aviation event as popular on the PC as it is in Nevada.

Choose from over 20 aircraft to fling around the skies

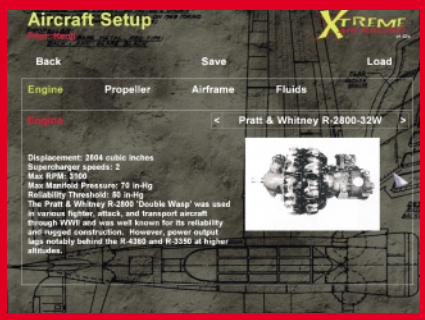
Two engines are better than one...sometimes

Pit Lane Pilots

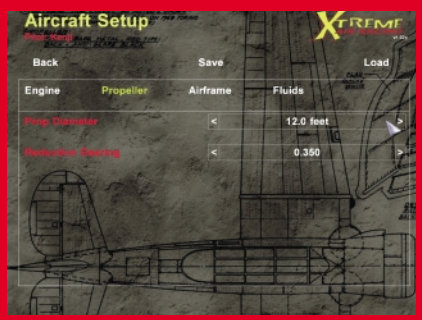
As well as having plenty to choose from on the aircraft front, Xtreme Air Racing gives you the chance to fine-tune your race animal for any given track. Altitude, layout and flying style can all affect how best to set up your plane. Just like in Formula One, shaving off fractions of a second can win you races and championships. This is where practice and qualifying are important for serious racers, as here you get the chance to try out different configurations and go for that perfect lap time. The full list of parameters you can change is extensive, so be sure to take a look at the README file and check the XAR website for setup tips. Here's the list of possible tweaks that will help give you that edge when race day dawns:

- Engine type
- Propeller diameter
- Reduction gear ratio
- Faired-in flaps
- Wingspan
- Low-drag cooling ducts
- Fuel
- Spraybar cooling water
- ADI (Anti-Detonant Injection) fluid
- Nitrous oxide bottles

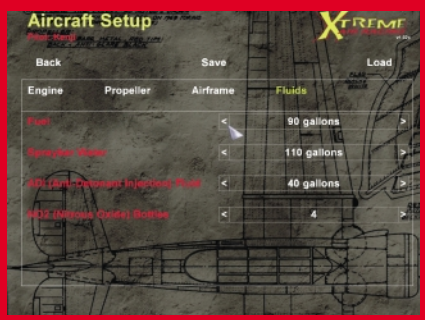
First pick a plane - they're all monsters



Down to the engine shop...choose your power plant carefully



Big and slow, or small and fast, the prop diameter is easily changed



Remember, take on plenty of fluids for a healthy race

Creep up too closely on another plane and you'll be tossed to high heaven in a whirlwind of propeller and wing tip wakes. If you're too close to the ground then this can quickly end in disaster, so it pays to choose your racing line carefully to avoid the turbulence. Wrestling with the aeroplane as it is buffeted around proves to be quite a challenge, and that's before even thinking about your race tactics. The constant battle with the swirling air and cunning competitors makes for an exciting ride. Limited force feedback support unfortunately means that your joystick doesn't fight back as the turbulence hits, which is a shame.

As any Reno pilot will tell you, the key to winning is pushing the plane and pilot to the absolute limit. This means thrashing the engine to within an inch of its life and flying at the very edges of the flight envelope. In XAR this involves a good degree of engine management throughout the race. For an extra kick, nitrous oxide is fantastic, but will burn out your engine well before the chequered flag. Judicious use of ADI (Anti-Detonant Injection) fluid and spraybar water for cooling is essential. In full-screen mode a useful HUD (Heads-Up Display) shows the condition of your tortured engine, how fast it's wearing out, and a host of other information. For purists there's a virtual cockpit view with crisp instrument panels.

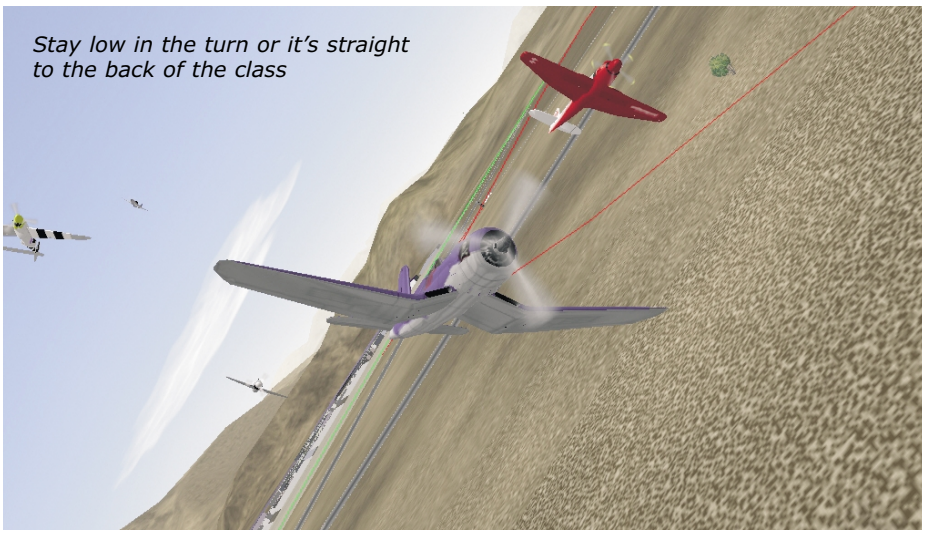
Sightseeing not advisable

Our favourite view is the Turn Look Through view, which always points you towards the next pylon. This feels the most realistic, and is enough to give you simultaneous head rush and motion sickness. It's easy to pan the view with the joystick hat and zoom in and out using the [Home] and [End] keys. Still, keeping track of where the other planes are while screaming around corners at 50 feet and over 400mph isn't the easiest thing in the world, so collisions can occur. If you're unlucky enough to clip another competitor then you'll more than likely witness spectacular cartwheeling fireballs. If you manage to stay at least partially intact then it's time to look for the runway and carry out an emergency landing.

Belly landings, as well as flaps and undercarriages, are all modelled well. Reno Ace Lyle Shelton, who is a big fan of XAR, considers this an important feature and is encouraging pilots planning to enter the real Reno Air Races to use the game for emergency procedure training. Praise indeed. If it's good enough for Rare Bear's daddy, then it's good enough for us. Luckily you can turn on an invincibility cheat so you don't have to worry about having to limp home - a luxury that real pilots don't have.

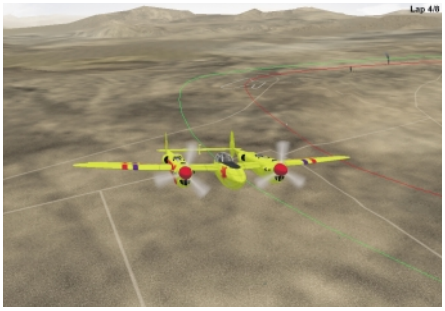
Fast...and smooth

Tearing around the tracks - more than 50 of them - is an awesome experience,



Stay low in the turn or it's straight to the back of the class

Nose-to-tail action at fifty feet



Wacky Racers come to town!

The Voodoo P-51 is real magic to fly

You'll have to try harder than this to unlock the extra tracks and planes

which is helped by the incredibly smooth graphics. They were designed using a package called MultiGen Paradigm, which has a fine pedigree. It's used for many high-end military simulators where fresh reconnaissance image data is plugged into the simulator so that pilots can preview upcoming missions. The quality of XAR comes very close to this, with lovely texture mapping and cracking frame rates, even on a lowly 500MHz PIII PC.

A true sense of ground rush ensues when your plane gets close to the deck; You're not supposed to fly below the height of the pylons (50 feet), but when you do it's scary as heck. The planes themselves are wonderfully detailed, right down to the tiniest sponsorship stickers. One problem we did find was occasional stuttering while the commentary was switched on, but simply turning it off solved the problem. We've been told that XAR runs best with the latest ATI Radeon video cards, although it's still sweet on our budget 32Mb GeForce2 MX card. Just make sure your graphics card has good OpenGL support. Voodoo cards are supported using their native Glide drivers.

Flies well, sounds great

Along with the impressive graphics come some incredibly raunchy sounds, and the race announcer provides a continuous commentary, although it can become a little tedious. Users can record their own voices, though, including custom plane names, and 'colour' commentary, but we were generally happy to turn this off for the sake of the frame rates. Music files aren't included, apparently for legal reasons, but you can play your own WAV files, either recorded or converted from MP3, during the game. No direct MP3 support is included because the decompression is too CPU-intensive and would slow down the on-track action; the kind of music we prefer to hear is the roar of a Merlin engine at full throttle, and in XAR this is fantastically realistic. The engine sounds are generated on-the-fly using a Staccato Synthcore library of sounds; this constructs the sounds depending on what the engine is doing, and has that raw bite to make your heart really keep pumping. This does hit the CPU hard, however, so the MEDIUM sound option only applies this special technique to your own plane, while using WAV files for the others. This does detract a little from the atmosphere, but we had no problems running high sound detail on our 500MHz PC.

Career opportunities?

The good folks at Victory have kindly listened to our pleadings for a track editor, and so you can create your own courses with a graphical tool and a little bit of cutting and pasting into a text-based course file. You can save your own customised aircraft setups too, and the XAR website has an upload and download section for sharing courses, setups and commentary sound files with fellow race fans. The only major downside of Xtreme Air Racing is the lack of a career mode - something that car racing games have taken a long time to include. Take Gran Turismo 3 on the Playstation 2, for instance. There you start with a very basic vehicle and only by winning races can you afford to upgrade the parts. Eventually you can afford to upgrade your vehicle and, as your skill improves, so do the challenges. In XAR personal challenges take the form of the Bronze, Silver, Gold and Platinum championships. Each one is available on a set of courses: basic, tricky, endurance and, of course, custom-designed ones. So there's plenty of variety in trying to win different championships with different aircraft, but a true career mode would have been even more satisfying.

With multiplayer support for some absolutely crazy race action, and a combat mode where you can really fling the aircraft around the skies, Xtreme Air Racing has tons to offer thrill-seeking aviators everywhere. The sense of speed, exhilaration and flying on the edge is awesome. It's original, expandable and, most of all, barrel rolls of fun.

At the time of going to press, Xtreme Air Racing is only available over the Internet, but by the time you read this a European publishing deal should have been finalised. We'll keep you informed. ■

Kenji Takeda

REVIEW SCORE:

Publisher:	Victory Simulations	**Price:**	$29.99 + p&p, $5 (USA) or $10 (International)
Developer:	Victory Simulations		
Website:	www.xtremeairracing.com	**Release Date:**	Out now

At a glance: The thrill of air racing is conveyed fantastically in this fast and furious simulator. This is as exciting as flying gets. Some commentary slowdowns, limited force feedback support, plain graphics, the lack of a career mode and printed documentation are the only blemishes in a cracking good game.

SYSTEM REQUIREMENTS: PIII 450MHz, 128Mb RAM, graphics card that supports OpenGL or 3DFX GLIDE

RECOMMENDED: PIII 900MHz, 256Mb RAM, 64Mb graphics card

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Battle of Britain Memorial Flight

A German crew are about to experience Kentish hospitality

Memories are made of this!

Just Flight's latest expansion in their Royal Air Force 'franchise' Battle of Britain Memorial Flight arrives in the shops shortly after Flight Simulator 2002 (in the UK) and boasts compatibility with FS2000, FS2002 and Combat Flight Simulator 2. Pretty impressive, as it's an all-new product, not a patched re-release. Developed by Blue Arrow and based around the world-famous Battle of Britain Memorial Flight, it contains all 11 aircraft from the flight in great detail, scenery from Coningsby, the Flight's home base and 25 missions for combat fans. Does this make for the perfect expansion or is BBMF in danger of trying to be all things to all simmers?

The box proudly states: "Ever since its formation as the Historic Aircraft Flight in 1957, the Battle of Britain Memorial Flight has served as a flying tribute to Britain's defence of the free world in the dark days of war … the BBMF regularly flies to shows and anniversaries, providing an airborne reminder of the great sacrifices made for freedom. A nation that forgets its past imperils its future…" However, prose alone is not enough of a selling point for today's discerning fans of historic aircraft expansions.

RAF Coningsby in all its glory

Supplied on the single CD is a user-friendly installer program that puts BBMF painlessly into all three host simulations and as a bonus, the official RAF BBMF screensaver is also included on the CD. Bucking the current trend of saving on printing cost and putting the manual on CD, Just Flight have included an impressive full colour printed manual, including a reprint of the official Royal Air Force BBMF 2001 brochure. This manual covers everything from the installation to optimising your simulators to work best with BBMF and everything in between. Virtually all the information that you need to fly BBMF is included, from aircraft speeds and how to fly a circuit in each aircraft, to detailed instrument panel pictures and gauge descriptions. There's even detailed instructions on how to manually start the aircraft engines and CFS2 users are blessed with background and descriptions for the missions and the operational combat side of BBMF.

There's such a varied choice of aircraft you have no excuse but to enjoy the full gamut of flying experiences from the single engined Chipmunks, via the Dakota to the Lancaster. If you are asking what Chipmunks or a Dakota have to do with the BBMF, the answer is simple.

The Battle of Britain Memorial Flight is famous for its trio of Spitfire, Hurricane and Lancaster, but they actually own eleven aircraft in all and each one is included in BBMF sporting its current livery

- Chipmunk WK518
- Chipmunk WG486
- Spitfire Mk IIa P7350
- Spitfire Mk Vb AB910
- Spitfire Mk LFIXe MK356
- Spitfire Mk XIX PM631
- Spitfire Mk XIX PS915
- Hurricane Mk IIc LF363
- Hurricane Mk IIc PZ865
- Lancaster B1 PA474
- Dakota ZA947.

At last! A custom screen for CFS2

The Chipmunks are used for tail-wheel conversions and currency trainers for the Flight's fighter pilots and the Dakota does likewise for the Lancaster and also doubles up as a logistics aircraft when the BBMF are touring in the display season.

The aircraft are visually very impressive and are some of the best we have seen, really capturing the looks of these classic machines. All have transparent canopies, animated surfaces and gear (not the Chippys of course!), while the authentic sounds are a delight to experience. Opening up the four Merlins on the Lancaster truly makes you feel this is as real as it gets. One tip though - as the aircraft use highly detailed textures (skins) you may need to adjust your FS XX graphics settings so you have crisp textures, but this is all explained in the manual.

Just Flight say that the aircraft in the software have actually been flown by serving BBMF pilots, who even recommended changes to the flight models. Not having put in a huge amount of time on Lancs and Spits in the last few months, we can only say that they feel excellent, right down to torque effects on the Spitfires.

Each aircraft has custom-built instrument gauges and panels. The Spitfires and Hurricanes all have excellent looking virtual cockpits, which will delight CFS2 pilots as these are most useful in combat. In FS2002 and CFS2, even the instrument gauges are operational in the virtual cockpit view. We asked Just Flight about the panels and they told us that they were painstakingly researched from the real aircraft and operate as much as possible like the real thing. In fact, some of the fuel gauges are so authentic that they can be quite daunting to understand but once more the excellent manual comes to the rescue with detailed explanations of more obscure gauges.

All the planes have a unique switchable 'Hi-visibility' panel view that gives the pilot a higher perspective from the cockpit. Although the instrument layout in this hi-visibility view is not authentic, it serves the very useful purpose of giving good 'over the nose' visibility, especially at the landing and take-off stages, while still giving you all the instruments required to fly the aircraft at these critical stages of flight. It can also be used to give you a better view during combat.

View of the Spitfire Vb's virtual cockpit

Tally Ho!

The Avro Lancaster – frightening in war, majestic in peace

One feature we have never seen before on any add-on is the pop-up kneeboard 'checklists'. These have been customised for each BBMF aircraft and give you information such as the vital aircraft speeds and how to fly a typical circuit. Very useful, unless you've got a real Spitfire in your shed!

Royal Air Force Coningsby, the home base for the BBMF, is included for all three simulators. Once again, this is very accurate and is based on actual research at the base. As well as the actual hangar and offices that the BBMF operate from, all the major buildings are modelled, including the hardened aircraft shelters. On the main apron are static Tornado F3s and surrounding those are objects such as the fire station, airfield control van, moving radar dishes, lighting towers, trees and fuel dumps. You'll even find the officers' mess included among the many other features.

We were pleasantly surprised to find that BBMF was compatible with Flight Simulator 2002 and, to prove that they haven't rehashed an old product, Just Flight have included features to take full advantage of FS2002 such as ATC callsigns and grouping all the aircraft under 'BBMF' in the new Select Aircraft menu. They have also included a BBMF start situation that places you in the Spitfire Mk IIa on the runway at RAF Coningsby. We did notice that if you use this situation the engine occasionally stops within a few seconds. The way around this is to start the engine manually (as described in the manual) or load a default Microsoft aircraft with its engine running and then load the situation. This issue seems to be a hangover from FS2000, as we sometimes found this happening with other aircraft in the past.

Mr. Camm's masterpiece in action

An outside view – normally reserved for the enemy!

However, once you've flown the aircraft, enjoyed the flight models and marvelled at the scenery in FS2000 or FS2002, then a trip to CFS2 is required, where BBMF really shines. We were impressed with its ability to transport you back to the desperate but heroic days of WWII and even beyond to the Cold War!

Just Flight seems to have gone to great trouble to make BBMF as immersive as possible. A BBMF icon lives on your desktop and you can click this to start BBMF directly in CFS2. This clever little background program swaps the internals of the default CFS2 program so that it is now 'CFS2 BBMF' rather than 'CFS2 Pacific'. However, once you close down CFS2 all your default settings will be restored. If you wish to fly CFS2 normally or with another add-on you simply start CFS2 in the normal way. One excellent result of this system is that you can bid farewell to the 'Andy Warhol' backgrounds and each screen you encounter has custom BBMF artwork or pictures on it.

In CFS2 you also have the interesting choice of dressing the flight crew in either WWII or modern day flying kit and helmets. For WWII combat we strongly recommend Irvin jackets and leather helmets.

The 25-mission campaign included is very authentic, with the emphasis on historical accuracy. The missions range from morning patrols and bombing V2 rocket bases to photo-reconnaissance missions. They certainly tested our flying skills and were genuinely satisfying to complete. A nice touch is that all the medal and awards screens are customised for the RAF.

All the aircraft are available for use in Quick Combat mode and there are non-Battle of Britain missions so you can fly the whole aircraft range in combat. There are bombing missions in the Lancaster, a Dakota flight over the Alps and even the Chipmunk sees action, getting buzzed by a MiG-19 in Germany during the Cold War. There's also a fleet of AI aircraft including Stukas, HeIIIs BF110s and Me109s to keep you on your toes!

Overall, BBMF is an excellent package. As an expansion for CFS2 it's got more going for it than just being a simple Battle of Britain add-on. However, combine Battle of Britain dogfighting with heavy bomber action AND the chance to fly a slice of heritage in FS2000 or FS2002, and you have a complete product at a reasonable price.

Axel Reece

Normal Hurricane 2D panel

The Hi-visibility Hurricane panel

No back-seat drivers in this Chipmunk

Plenty of room inside for black market whisky and nylons!

REVIEW SCORE:

Publisher:	Just Flight	**Price:**	£24.99
Developer:	Blue Arrow	**Release Date:**	Out now
Website:	www.justflight.com		

At a glance: A complete package that should please most simmers, especially with universal compatibility in FS2000, FS2002 and CFS2, and a proportion of the proceeds going to the BBMF. Minor bug (that may be an FS error), but otherwise brilliant.

SYSTEM REQUIREMENTS: PII 300MHz, 64Mb RAM, 8Mb 3D graphics card

RECOMMENDED: PIII 450MHz or higher,128Mb RAM, 16Mb 3D graphics card

Flight Line

A Six-Pack for the GA Pilot

The MU2 Transport - ideal for big jobs

There's nothing more stimulating than walking across the virtual tarmac for that first flight in a new bird. In fact we're told that this excitement is no less intense for the lucky few who get to fly for a living! Aircraft add-on packs have become enormously popular with the flight simulation fraternity, and you only have to look at the sheer volume of aircraft on offer through the online freeware sites to realise that the demand is almost insatiable.

The Flight Line package consists of six new aircraft for the GA pilot, and comes from a consortium of designers, headed by Ray Pennington, under the 3AVIA banner. The planes are a good mix of light singles and twin-engined craft, with custom panels, sound files and realistic flight characteristics.

You can either buy and download the 37Mb package online, or get it on a single CD through the post (the prices are almost identical). In neither case is there any physical documentation, however, but the authors have provided a text file to guide you through the single click installation; they've also produced a general information document outlining the settings required to get the best from the collection, and dealing with a few known issues that affect owners of video cards based on the Voodoo chipset.

The aircraft include the Cessna C177 Cardinal, an overwing single not far removed from the Flight Simulator 2000 default C182, the Socata TB-9 Tampico, and high-powered TBM 700 singles. You'll also be able to fly the lightweight Cessna 310 and E55 Baron twins, and the largest aircraft in the collection, the stylish Mitsubishi MU-2 turboprop twin. The panel displays for all these aircraft are designed to show the complete array of instruments within the main forward view; visually, this isn't ideal if you have a 14 or 15-inch monitor, but we found no obvious flaws in the instrumentation itself during the course of the review.

Remove the yokes for a clearer view

It's no yoke!

The strength of the Flight Line package is definitely in the accurate performance and handling of the aircraft, because the modelling and texturing is well below the standard you'd normally expect to find in a commercial product. The panel bitmaps are adequate, although crude when compared with those from Dreamfleet or Phoenix. Likewise, the external views reveal fairly basic fuselage shapes, with no great detailing and rather flat paint schemes.

Having said that, all the aircraft display a stability that makes them a joy to fly, regardless of their appearance, and for many pilots this will be far more important than the often processor-hungry visuals. Ultimately, if you spend more time looking at your aircraft than flying them, then you'll be disappointed with this collection, but if the realistic representation of GA flight is important to you, then this six plane line-up will take pride of place in your hangar. ■

Joe Lavery

External views lack any real detail

Cessna 310 - too pristine to be a club trainer

Panels require a large monitor for ease of use

REVIEW SCORE:

Publisher:	3AVIA	**Price:**	£22.00 approx. (CD)
Website:	www.3avia.com		£23.00 approx. (download)
Developers:	Ray Pennington, Chuck Dome, Mark Keith, Brian Gladden, & Jim Turner	**Release Date:**	Out now

At a glance: Not many add-on packs concentrate on GA aircraft; this new collection from 3AVIA helps to redress the balance

SYSTEM REQUIREMENTS: PIII 400MHz, 64Mb RAM, 3D graphics card

RECOMMENDED: PIII or Athlon 1000MHz, 133MHz Bus, 256Mb RAM, 32Mb 3D graphics card

Getting to grips with the ILS

Keeping those needles in the middle - it's easy when you know how

Passengers always assess a pilot's ability on the smoothness of the landing, but during bad weather this will be one of the least challenging parts of a flight. The most important aspects of a landing will be firstly finding the runway and then positioning the aircraft for the eventual landing. This isn't too difficult when you can see the runway from a reasonable distance, but there are many days when the weather is just not good enough for this, either because the cloud base is too low or because the visibility is poor. In these circumstances the pilot has to line up with a runway which is not visible, and that inevitably involves some type of instrument approach. The most effective system for precision instrument approaches is the ILS (Instrument Landing System), and consequently this has become the standard approach for just about any reasonably sized airport.

What is an ILS?

The ILS is a set of four radio wave transmissions from an airport, which can be interpreted by an instrument in an aeroplane's cockpit to show whether the plane is on the correct path for landing. During the final approach for landing, a vertical localizer needle (CDI, or Course Deviation Indicator) moves left and right to show if the plane is too far left or too far to the right. A horizontal glide slope needle (Glide Slope Indicator) moves up and down to show if the plane is too high or too low. The localizer signal is produced by two overlapping radio signals transmitted from an aerial which looks like a catch fence, and is positioned at the upwind end of the runway. The transmitters for the two overlapping glide slope signals are located on a pole at the side of the touchdown zone.

The indications on the cockpit dial have to be accurate and sensitive enough to guide the plane precisely to the touchdown point. To achieve this, the needle will be fully deflected when the plane is 2.5 degrees away from the localizer. One consequence of this is that you will have to fly to the nearest degree of heading. If you only fly to the nearest 5 degrees your potential error is already equal to the maximum needle deflection angle, and you will have great difficulty as you get close to the runway. Your accuracy for the glide slope will have to be even better, because the beam is only about 1.2 degrees from top to bottom, making it four times as sensitive. To put this into perspective, if you are flying accurately with less than one course deviation dot deflection on the ILS needles and have one mile to go, you'll need to be within a patch of sky about 100 metres wide and about 10 metres high. This box gets steadily smaller as you approach the runway, which makes it correspondingly harder to hold the needles in their central positions. The level of accuracy required to fly an ILS down to low altitudes often leaves beginners bewildered and suspecting (incorrectly) that there are instrument defects, radio signal problems, or that their simulator is not functioning properly.

Many ILS have marker beacons that are used as fixed reference points along the ILS. Not all airports have markers, however, but where they are installed there will normally be an 'outer marker' or LOM (Locator Outer Marker), which is typically either at the FAF (Final Approach Fix) or at the position where the pilot would expect to start descending on the glide slope. A middle marker is less common, but would be somewhere near the decision height point. Inner markers are now exceedingly rare in the UK, but would be found near the start of the runway itself.

You should also be aware that the old Kai Tak airport at Hong Kong was not the only airport with an ILS not aligned with the runway. A few civil, and many military, airports need a small turn on short finals to line up with the runway. Fortunately the final turn is usually less than ten degrees, and nothing as drastic as the 47 degree turn required for Kai Tak.

Getting prepared

Before setting off on your flight you'll need to consider whether you can land in the conditions which have been forecast for your destination. You should check both the cloud base and the strength of the wind; compare these to your personal limits and those of the aircraft. A typical light plane would have a maximum allowable crosswind component of 15 knots. The cloud base you can accept depends on the category of approach; a typical manually-flown ILS would require a cloud base of at least 200 feet, although a pilot with an IMC (Instrument Meteorological Conditions) rating in the UK would be limited to 500 feet.

As you approach your destination, you would review the weather again to ensure it is not outside limits. If it is, you should either hold until the weather improves, or divert to another aerodrome. Fortunately this is flight simulation, so you can still choose to try and land in conditions which are far worse than the normal limits.

Using the ADF to monitor progress towards the localizer

You won't see anything of use out of the windows

You should also read the ILS plate, which is really just a 3D diagram of the route you must fly. Make a mental note of the key elements of the procedure that takes you to the final approach, in particular the headings, heights, DMEs, glide slope angle and timings. Next, roughly calculate the effect of the wind on these headings. The easiest way to do this is to look at the angle between your track and the wind (e.g. track 230 and wind 270 gives the angle as 40 degrees). Now look at your watch face and see which 'quarter' this is closest to; 40 minutes past the hour is closest to three quarters past the hour, so use three quarters of the wind speed to calculate your drift. (e.g. a wind speed of 20 knots multiplied by three quarters is 15 knots). Now take half of this (7 knots) and use that as your drift, turning into the wind. (In the example the wind is from the right, so turn right 7 degrees onto heading 237.) You can get far more sophisticated than this, but it's generally not worth it because the exact behaviour of the wind is not that predictable anyway.

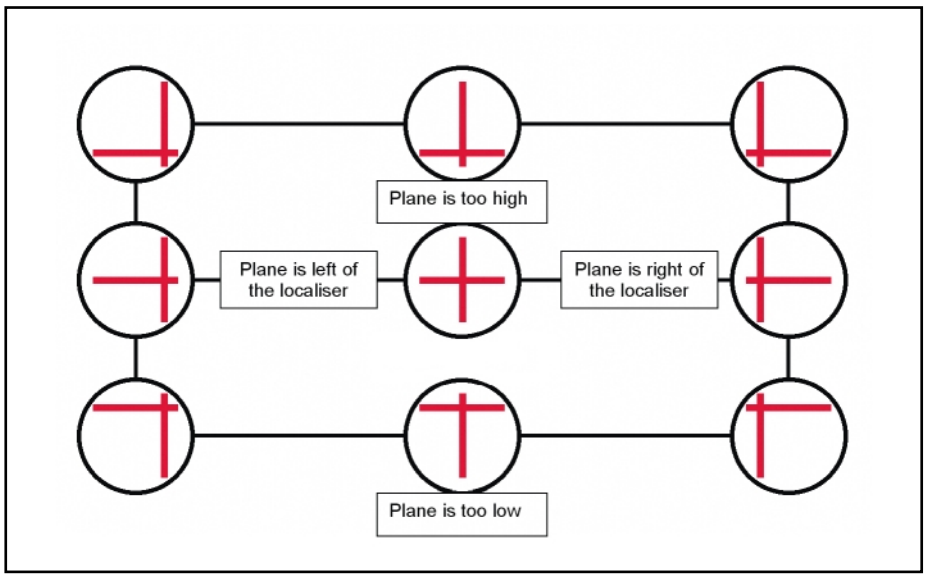
You should also check that your DI (Direction Indicator, or Gyro Compass) is aligned with your magnetic compass, and that you have tuned and identified all the relevant beacons. Finally you should decide on the speeds at which you are going to fly the procedure and the final ILS approach. For a light single plane you would normally fly the approach at about 90 knots, and for a heavy jet at around 150 knots.

Approaching finals

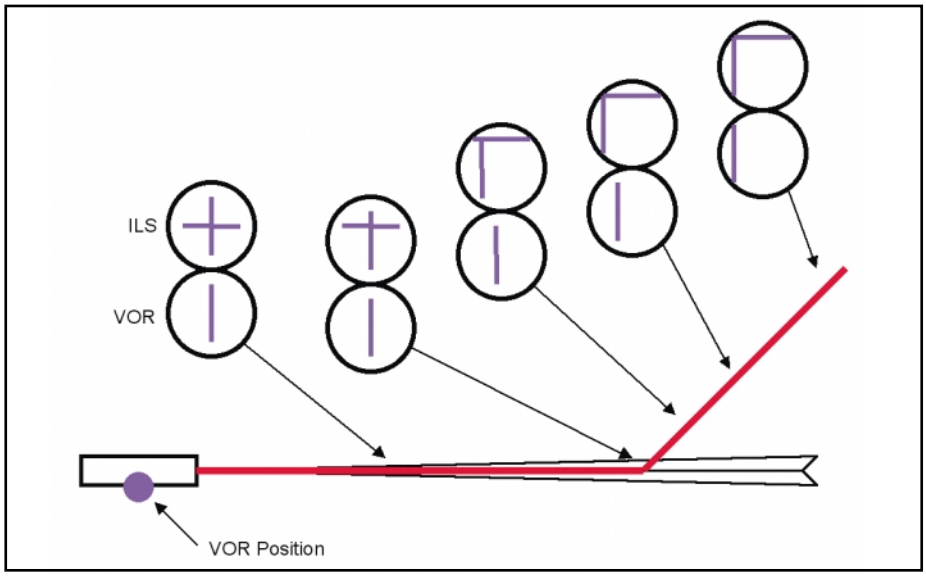
As you approach most international airports, it's highly probable that you would be given radio vectors that would position you on an intercept with the ILS; this really does take a lot of the strain out of flying an approach. There will be times, however, when you'll need to fly the full procedure, so you must be proficient at flying them. You should also aim to complete your pre-landing checks during this approach phase of the flight, and certainly before you reach finals.

Whichever way you arrive at the ILS, you should find that you intercept the localizer first and that you are below the glide slope. You would normally be told to "report localizer established", and when you do, you would be instructed to "descend with the glide slope".

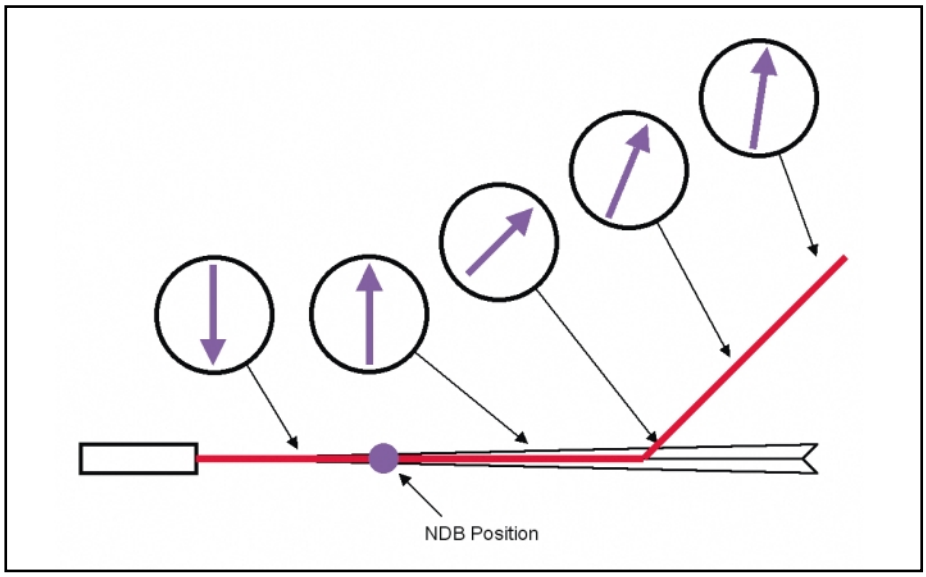
One possible problem that pilots can encounter is knowing when to start the turn onto their final approach heading. There are two keys to this: Firstly you should be able to anticipate when you will need to start your turn onto the localizer. If you can do this, you'll be primed and ready to react when the moment comes. So what you must do is find something that will help you predict the turn, and the two most likely candidates are a VOR or an NDB (Non-Directional radio Beacon).



How the CDI and glide slope needles react when flying the ILS



Using the VOR indications to predict when you are about to intercept the localizer. See how the VOR moves long before the ILS, and how the localizer is intercepted before the glide slope



Using the ADF indications to predict when you are about to intercept the localizer. With a 45 degree intercept angle from the right, the ADF shows 45 degrees right as you reach the localizer

The ILS at London City has a very steep glide slope to test your skill

Visual and preparing to land at London City

As an example, if you are turning onto Glasgow 23 ILS (110.1 ident IOO), you can tune NAV2 to 115.4, which is the GOW VOR on the airfield; now set the OBS (Omni-Bearing Selector) to the 233 radial. As you approach the localizer, you will watch the VOR needle drift in slowly long before the localizer needle moves. Repeat your approach to Glasgow 23 and this time tune your NDB to 350, which is the GLG NDB at the IAF (Initial Approach Fix). This time as you close onto the localizer on heading 278, you'll see the ADF needle swinging round to the left hand side until it reaches 45 degrees. At this point you will be over the localizer. 45 degrees is the normal closing angle on a procedure turn, and you would have to adjust this for the particular approach (or closing angle) and for the wind.

The same principle works for an RMI (Radio Magnetic Indicator). Where the bezel on the ADF is slaved to the DI, or where the plane has a sophisticated HSI (Horizontal Situation Indicator), it gets even easier. In this case you can see the needle approaching the final approach / localizer heading and you don't even have to consider wind in your calculation. Using one or both of these techniques will enable you to anticipate the time to turn onto the localizer.

The second part of becoming established on the localizer is knowing when to actually start the turn itself. The best time for this is the obvious one. Having anticipated that you are almost on the localizer, keep a close eye on the localizer needle and start your turn as soon as it moves; It will come in quite quickly, but you will have sufficient time in all but a strong wind. It's not at all advisable to anticipate this turn, because there is a tendency to turn too soon. This then delays you becoming established on the localizer and can prevent you being established before you reach the glide slope. It's better either to wait, and if you look like you will fly past the localizer, either increase your rate of turn a little, or to fly through the localizer and continue the turn to establish from the other side. In practice you're unlikely to fly too far through the localizer, even in a strong wind.

A variation of this is where you have to fly a teardrop approach, such as the one for Cork ILS DME (109.9) to runway 17. The principle is the same but there is a slight variation. The teardrop turn is shown as a smooth turn, but if you're battling into the wind, you'll need to delay the last 45 degrees of your procedure turn onto the localizer. The localizer heading is 167, so you would stop your turn and fly a heading of 122 degrees until the OC (343 KHz) shows a 45 degree offset on the ADF and the localizer needle starts to move.

The more you practise these tricks of the trade, the easier you'll find it to latch onto a localizer. Part of the art of flying is to get as many cross references as you can, so that if one thing fails, you still know exactly what's going on.

If you are flying a retractable, and you haven't done so yet, now is a good time to lower your undercarriage. You don't want to do this too early, but it's a good idea to get it out of the way before things hot up down the ILS itself. Some pilots prefer to lower the undercarriage just as they start their descent on the glide slope because the extra drag balances the acceleration due to gravity when they lower the nose.

You've already calculated your expected heading and you've selected your speed, so stick to them initially. You should not change your speed at all, but it would be most unusual not to have to change your heading a few times. When the glide slope needle is in the middle, and not a second before, reduce power slightly with the throttle and let the nose sink to begin your descent. Until this point you must hold your altitude. The only exception to this would be in a fast jet, where a small degree of anticipation is sensible. Staying on the glide slope is easier in a real plane than in a flight simulator because of the high degree of inherent stability of a well-trimmed aircraft in pitch. In a simulator you'll just have to do the best you can to achieve the optimum trim and to nail the glide slope needle bang in the middle.

Shooting the ILS

Now you are on the ILS there are several tasks to contend with, so multitasking is very much the name of the game here. The undertaking most likely to keep a beginner busy, however, is keeping those needles glued to the middle ring of the dial. Different pilots have different ways of tackling this problem. The method given here works under almost all circumstances and is a great way to learn. Once you have perfected this skill, you'll be able to modify it a little and anticipate what the needles are about to do, but if you are having difficulties, this procedure will guide you back into the slot.

The method is based on the good old computer technique of binary searching. Let's assume that the perfect heading for an ILS, which accommodates the wind, DI inaccuracies and everything else, is 007 degrees. However, we don't know this yet. Our initial guesstimate was 020 degrees - we were wrong but that's normal. We fly 020 degrees and the localizer needle drifts out to the left, so we now know two things; we know that we have to turn left, and we know that 020 is too far right. The needle is moving quite quickly so we decide that a relatively strong turn is required. North is an easy heading to use, so we turn left onto 360 degrees. This starts to bring the needle back (if it didn't we would turn a little more) so stay on this heading until it's in the middle. So now we have two more facts; we know that we have to turn right and we know that 360 is too far left. We've now established that the actual heading must be somewhere between 360 and 020, so let's try splitting these two and flying 010 degrees. This is the art of binary searching.

The process starts again; the needle drifts left, so we know that the heading is somewhere between 360 and 010. We split the difference again and the new heading is 005, and the needle drifts right, so now we know the heading is between 005 and 010. You can now choose 007 or 008 as the mid-point, and the needle will barely move. If it does, make single degree heading changes. You made four easy adjustments and are flying within one degree of the optimum heading.

As mentioned above, the keys to holding the glide slope are maintaining a steady speed and trimming the aeroplane perfectly. Remember that a change in speed gives a change in lift, so if your speed is all over the place, the lift will be too, and consequently so will the glide slope needle. The other trick to holding the glide slope is to hold the plane's pitch steady and only change it by tiny amounts. If the needle moves up, pitch the plane up by about one degree and wait and see if this helps. You can also do a binary search for pitch, but it isn't normally necessary if the plane is flown and trimmed correctly. Don't forget to increase throttle slightly as you pitch up, and reduce throttle slightly as you pitch down.

Breaking cloud at 100 feet and you can't see the other end of the runway

When it's as misty as this, you'll need the ILS at the other end

Once you have the needles centred, you must react immediately if the needles start diverging again. Watch how fast the needles are moving and determine your new heading and pitch accordingly. If the needles are moving very slowly, make very small adjustments of only a degree or two. If the needles are moving quickly, make a large adjustment of about ten degrees, and do another binary search to find the new heading required.

Remember that it's always easier to keep the needles centred than it is to let them drift way off centre and have to get them back. It is also easier to recover from the windward side rather than the downwind side of the localizer, so if you're having great difficulty coping with a crosswind, try to err on the upwind side.

Trying to keep the needles bang in the centre is difficult, so be sure that you don't fall into the trap of fixating on the ILS needles, or any other instrument for that matter. Your concentration should be focused on the AI and the DI. You should then frequently scan across to the ILS needles to decide what heading and pitch changes you should make.

If the approach is very gusty, and it often is when you are instrument flying, the natural stability of the plane should make it swing back onto your heading and pitch without too much help from you. If not, simply keep targeting your chosen heading and pitch. The plane may bounce around a lot, but the average will be your heading and consequently the approach is likely to be successful. If you do start to lose the needles, don't chase them, but rather turn ten degrees towards the needle and return to the binary search technique. If you lose them completely, you must execute the missed approach procedure. The real key to flying an accurate approach is to use the ILS needles to help you decide what heading and pitch you are going to fly, and then flying them accurately on the Artificial Horizon (AI, or Attitude Indicator) and Direction Indicator. If you try to fly the ILS needles instead, turning left when the needles move left, and so on, your approach will quickly fall to pieces when the going gets tough. Pilots sometimes refer to themselves as 'aluminium tube attitude controllers'; this is said in jest but there is a lot of truth in the phrase.

Never bust your minimums

One of the absolutes for an ILS approach is that you must decide at your decision height whether to land or whether to execute a missed approach. You would get a big red cross from every examiner if you flew merrily through your decision height without making this crucial decision. With all the distractions of flying the plane, keeping the needles in the middle, communicating with ATC, pre-landing checks, and the passengers complaining that they feel ill, it's easy to ignore the altimeter. The best way to avoid this little death trap is to say out loud where you are as you pass through significant heights. So your calls may go something like this:

"1500 for 250"

"1000 for 250"

"700 for 250"

"500 for 250"

"400 for 250"

"300 for 250"

You're most unlikely to bust your minimum height of 250 feet at the end of all this. There is another mortal sin awaiting the unwary pilot here, and that is to fly the perfect ILS using the wrong altimeter setting. Make sure that you set the QFE on your altimeter so that it gives the height above the runway as soon as you are on the glide slope, or before if you prefer. Get this wrong at places like Nairobi and your 250-foot decision height will be nearly 5000 feet underground.

As with all instrument flying, you should only make small smooth inputs to the controls, and make relatively small adjustments to your heading and pitch; aim to keep your wings level as much of the time as possible. Set your throttle for the ILS, and if possible only make tiny adjustments. You should only need significant adjustments to the throttle if you are flying a heavy jet. Fly the AI and DI to control the attitude of your aeroplane. Monitor ASI, altitude, VSI and ILS needles to see if you need to make any small adjustments to the pitch and heading of the aircraft. Cross-check the turn co-ordinator to convince yourself that the AI is still working. If you feel confident you can also monitor the DME on some approaches and cross-check this with the heights published on the approach plate.

Any wind will affect the heading you need to fly, and you will already be allowing for this as you shoot the ILS, but there is a sting in the tail of the weather that you should be aware of. The wind will normally both reduce speed and 'back' as you get closer to the ground. Backing is when the wind direction number reduces (goes backwards), such as from 290 to 270. This means that you are likely to have to adjust your throttle and heading during the approach, but that won't be a problem now you have the ILS cracked.

Don't get distracted during your approach. With everything going on, and the growing use of ATC in simulation, you need to be clear on the hierarchy of actions you should use in flying, which are particularly pertinent to flying the ILS. They are:

- Aviate - Keep the aircraft under control and in a proper flight regime.
- Navigate - Know where you are and where you are going.
- Communicate - Talk to ATC and other aircraft.

You should not move on to the next priority until you have the previous one under control. If a wake vortex blows the plane upside down, for example, give up the map reading until the plane is under control again.

As you get closer to touchdown, the ILS will get more and more twitchy, but the principles remain the same; control the plane's attitude and make small adjustments. The nearer you are to the runway, the smaller the adjustments must be. If you are flying to low limits below about 500 feet, or if you're flying a heavy jet, you'll have to lower the flaps before you are visual. It should be done one stage at a time, making sure that the plane is stable before you lower the next stage. Lowering several stages in one go makes life hard for you because the trim changes are significant, which is one reason why those clever aircraft designers give you so many flap positions.

Just before you reach your minimums, it's always a good idea to make a final check that your undercarriage is down. Hopefully you became visual at some stage before you reached your decision height. This is not the same as seeing the runway itself; you have to see sufficient visual references to enable you to land safely. So if you can see the approach lighting that's enough to keep going. There's one more opportunity for your approach to fall apart, because the transition from instrument flying to visual flying is not as simple as it may seem. There is a distinct tendency for pilots to relax, take their eye off the ball, and suddenly lose the ILS just when things should be getting easier. They also tend to make sudden changes when the picture from the cockpit is not quite what they expected. The way around this is to start by using the runway as an extra input to your instrument flying, and then slowly increase the attention given to the visual references and reduce the attention given to the instruments. Whatever you do, continue to monitor your heading and pitch for some time after you are fully visual. At night, or in conditions of low visibility, you should aim to line up on the approach lights rather than the runway, using the cross bars for roll orientation. The approach lights are much more than a simple pointer to the runway location; they are a definite approach aid, so learn to use them.

Missed approach

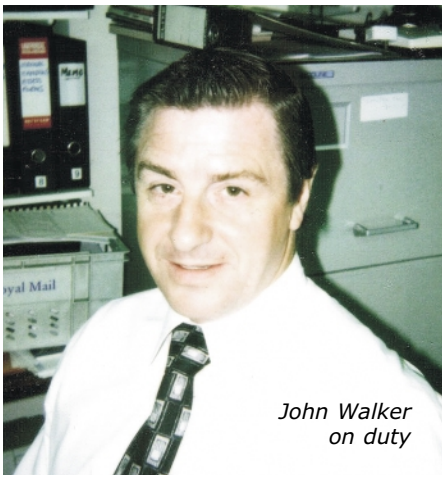
Hopefully all your ILS approaches will result in a successful landing, but if you can't be certain at your decision height that it's safe to land, then you must execute the published missed approach procedure. The main reasons for this might be that you are not visual, the runway is not clear of other traffic, ATC tells you to abort, or you simply don't like the approach you are flying and want to try again. If you do have to carry out the missed approach procedure, don't mess about. Apply maximum power immediately, pitch the nose up to the climb attitude, hold the required heading, retract your undercarriage, establish a positive climb, set the QNH on your altimeter, and start to raise your flaps in stages.

Practice makes perfect

Now you know how it's done, you need to fly as many ILS approaches as you can until they become second nature. As a guide, an IMC-rated pilot in the UK would be licensed to fly an ILS to 500 feet QFE and would be examined to 200 feet QFE. Fly your approaches in a mixture of cloudy and low visibility conditions and start with the slower planes. Gradually the ILS will cease to be the nervous instrument it once was, and you'll be testing your skill in the worst conditions that the simulator can throw at you…and you will succeed every time. The ILS will no longer be the impossible challenge it seemed when you first tried it, but will have become a tool you can confidently use at any time, and you'll wonder why you ever found it so difficult. ■

Stephen Heyworth

John Walker - Scenery Designer



John Walker on duty

Birmingham - John's local airport

Jaguars at RAF St. Athan in Wales

Digging the Scene

There are many unsung heroes in the world of flight simulation - people who selflessly beaver away producing free aircraft, scenery and utilities for no reward other than the occasional acknowledgement of their peers. In an effort to ensure that these folk get the accolades they deserve, we have decided to cast the spotlight over them occasionally and show just what they have achieved. We begin with a designer responsible for some outstanding UK airport scenery that rivals, and in some cases surpasses, many of the commercial packages. If you've been following our downloads section, the name of John Walker will already be familiar to you.

John lives in the Midlands, about 12 miles from Birmingham airport, and works as a Safety Adviser/Trainer for the local council. Other than flight simulation, his hobbies include being a martial arts instructor and the lead singer/guitarist with a local band. John has only been involved in the flight simulation scene for about two years; in fact it was the arrival of Microsoft's Flight Simulator 2000 as a present that originally started the ball rolling. The realisation that, with the help of a graphics editor and a little patience, he could easily customise the colours and livery of his favourite aircraft was what first led him into the world of design. His first tentative steps soon developed into more adventurous projects when, with the help of Airport 2.10 and VOD (Visual Object Designer), his first rendition of Birmingham airport was created.

John would like to express his thanks to the hundreds of knowledgeable enthusiasts who frequent the design forums of AVSIM, Flightsim.com and Simvation.com. John explains, "The members are so helpful; they share resources and tips freely, which is brilliant - particularly for a beginner." This willingness to help new talent is a pleasing feature of the flight simulation community that manifests itself everywhere. You only have to join a forum and ask a question to be bombarded with answers and offers of help, which effectively demonstrates how supportive these people can be, not forgetting of course the support and understanding of his computer widow wife, Karen.

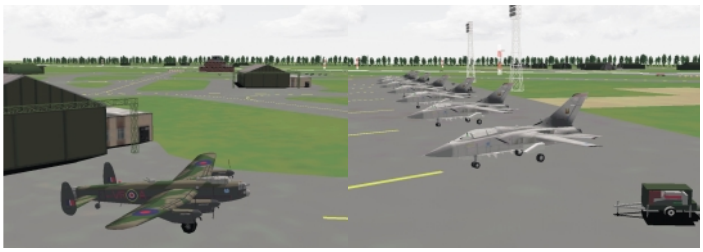
John tells us that the biggest problem facing designers is obtaining the plans, pictures and other details which are so important if you want to create an accurate design. This is even more difficult if the airfield you're working on happens to be on the other side of the world…which is exactly what happened in his latest project, the remote Cairns airport in Australia. This was developed in response to a request by an Australian enthusiast who simply wanted to fly from his home airport; he went out and took dozens of photographs, scrounged some maps, and sent the whole lot to John, who then spent weeks creating a realistic rendition just for the fun of it. You can see the results in the screenshot, or simply fly out there yourself, because we've included Cairns and most of John's other work on our latest cover CD.

Cairns airport - it would have spared Captain Cook a lot of trouble

You can find John Walker's website at www.avsim.com/hangar/flight/fsscenery ■

Joe Lavery

Cardiff and Coventry get a John Walker makeover



Bombers past and present at RAF Coningsby

PS1 Revisited

The Price of Precision

If someone were to suggest that you might want to pay almost £170.00 for a DOS-based flight simulator that ran in 640x480 graphics mode, without much in the way of an outside view, you might be forgiven for smiling awkwardly and edging towards the nearest exit. Strange though it seems, you could be shying away from a bargain . . .

Those of us unfamiliar with Precision Simulator 744, or PS1 as it's generally referred to, might consider it an expensive proposition at £169.95 for a 747-400 simulator, but if you consider the cost of Microsoft's Flight Simulator and all the extras you acquire over the years at around £30.00 a box, this could well add up to a lot more than the asking price for PS1. When you also take into account the fact that the many add-ons for PS1 are usually free, then all of a sudden the financial argument becomes secondary to the much more important question of how good PS1 actually is.

We reviewed PS1 in Issue 6, when we appraised it purely as a standalone product and gave it four stars, but in view of the plethora of free add-ons which have become available, we thought that we should take another look at it.

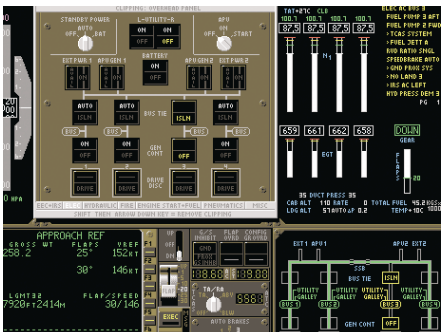
Upgraded and improved

Since that first review, PS1 has moved up to version 1.3a (the upgrade constitutes the first desirable free add-on). If we take into account the fact that buyers of PS1 include the training departments of companies such as Northwest Airlines, Lufthansa, and KLM - not to mention the research centres of NASA and other organisations - then no one can doubt that what we have here is a simulator which is so close to the real 747-400 that even the professionals are happy to use it. But does the level of realism make it too complex for the average enthusiast? After all, even experienced pilots don't climb the 32 feet up to a 747 cockpit without a lot of preliminary study and training.

The glossy 352-page manual is packed with so much detail that many of those familiar with the genuine Boeing manuals have commented that it's almost as good, and before you fly PS1 you do need to be familiar with the material in there. It is, of course, a reference manual, and the learning curve would be horrendously steep for those not professionally involved with aviation were it not for the availability of a comprehensive tutorial from the Aerowinx website. This takes you step by step from a 'cold and dark' cockpit in Glasgow through to a descent and hold into Heathrow's runway 09L, followed by a complete shutdown. It assumes knowledge of Microsoft's Flight Simulator

VOR navigation information displayed - note the NAV RADIO page of the FMC

Headed for Gatwick runway 08R (note the FMC HOLD page)



The electrical section of the overhead panel display (and associated synoptic view)

Sometimes it just isn't your day - you'll wish you had a co-pilot when the workload gets high

I don't much mind holds on the approach, but so soon after take-off… The MAP mode of the ND

as a starting point, and then leads you in gentle and detailed stages through all that you need to know in order to complete the first few flights. Complete with 16 appendices, the tutorial weighs in at 165 pages but, like the vast majority of PS1 add-ons, it's available free of charge.

In common with the majority of these free add-ons, the tutorial is password protected to the PS1 manual, so that only licensed users can open it. Incredibly, PS1 was written by just one individual with exceptional talents in graphic design, aviation, and programming - nobody told him it was impossible, so he just went ahead and did it. This means that the PS1 community as a whole is particularly sensitive to the need to combat piracy and keep him in business, especially as he is currently working on the next version, which will run in Windows and is scheduled for release in 2005.

PS1 doesn't just model a single configuration of the 744; it includes configurations for many airlines, including BA, Virgin Atlantic, Air France, KLM, Lufthansa, Qantas, and Cathay Pacific. Each configuration has individual parameters, for everything from engine type, which also affects the display on the upper and lower EICAS (Engine Indicating Crew Alerting System), down to whether there are individual autostart switches for each engine or just one for all of them. If you want to create your own airline variation, then all the 65 parameters which can be customised are meticulously documented in a file which you can download from the Aerowinx site, along with details of what's set up in each of the supplied configurations.

Experts Only?

As we said in our original review, this product isn't for everyone. Its stated purpose is to be a procedural and systems trainer, and so to fly it properly you obviously need to understand at least the basics of the 747's systems and procedures. If you're going to enjoy PS1, the first requirement is that you need to be willing to forget about being as real as Microsoft gets, and consider getting as close to reality as is possible without going to the expense of full-motion

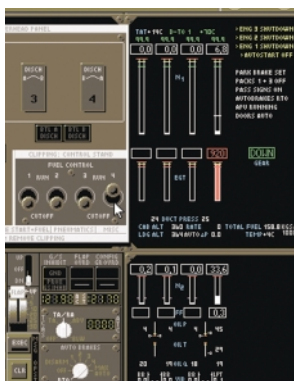
Primary Flight Display in PS1 (left) compared with the real thing (Qantas 747)

hydraulics and a mock-up cockpit. This will mean that you're going to have to make a certain commitment to learning and understanding. Nevertheless, the availability of the tutorial will be a big help in getting you started; the backup available on the Aerowinx forum is first-class, and many experts, including 747 pilots and engineers, supply answers to the questions that are inevitably raised. The real question, therefore, is how you feel about the challenge of investing the amount of time and effort required to master PS1, although many have confirmed that the satisfaction derived from doing so is immense.

Because all the aircraft systems are faithfully simulated, you also have the facility to work through all sorts of failure scenarios and unlike most other simulators, which lack the necessary internal systems logic links, the detailed effects of any failure are faithfully reproduced in PS1. Flying the aircraft with no possibility of anything going wrong is a simpler, but distinctly less exciting, experience. If you want to experience an engine failure at V1, firstly you need to understand the issues involved, then you can try it for yourself. Rudder pedals are recommended - the handling of PS1 is highly praised by those who fly the real aircraft.

Another factor to be considered is the resolution of the VGA (Video Graphics Array) graphics, and the relatively limited amount of eye candy. Although the graphics are, technically speaking, VGA, they are remarkably clear and also very subtly drawn, so that breaking out of the cloud into the clear blue sky, for example, lightens the whole cockpit. If you really feel that you can't do without some pretty scenery, then it's not a major problem; there are two different free add-ons available, either of which allows you to use Microsoft's Flight Simulator as your scenery generator, slaved in slew mode on a second networked computer.

The other possible downside is that PS1 is essentially a DOS product. This means that digital or USB joysticks can cause problems or even be unusable, and that for the sound to work properly a true SoundBlaster-compatible audio card is required (the SoundBlaster Live! works fine). PS1 may not give you everything, therefore, in terms



OK, whose idea was it to try this without using autostart? Engineering aren't going to be happy

Direct from the makers…

Simulator details: http://aerowinx.de/html/simulator.html

FAQ: http://aerowinx.de/html/faq.html

Stockists: http://aerowinx.de/html/order.html

Forum: http://aerowinx.de/forumv.cgi

Big Tutorial: http://aerowinx.de/html/brian_tutorial.html

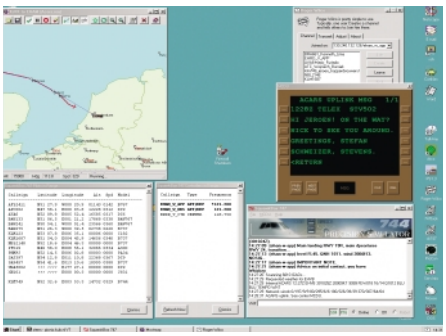
PS1 format videos: http://aerowinx.de/html/videos.html

SYSTEM REQUIREMENTS:

Intel Pentium PC or 486DX66 with VGA monitor and CD-ROM drive. MS-DOS 5.0 or higher, or Windows 95, 98 or ME. 40 Mb free hard disk space, and 535 Kb free conventional memory

RECOMMENDED:

Analogue joystick, rudder, throttle with IBM-compatible joystick adapter. Sound Blaster-compatible sound card



Occasional ACARS messages from fellow flyers can be welcome during the long hours in cruise

of sound and joystick options if you are running the very latest versions of Windows, so check the FAQs on the Aerowinx site and search the forum for full information about this. You'll also need to set yourself up with a Windows PIF file for PS1, unless of course you boot from a DOS floppy and simply ignore Windows altogether (remember HIMEM.SYS?). The big advantage of a simulator being DOS-based is, of course, that you can run it on a PC with very modest specifications, and reserve your mammoth megahertz monster for Microsoft's well known scenery generator. Forum postings from committed users of PS1 verify that it will run perfectly well on Pentium 133 and 166MHz systems.

Impressive add-ons, and they're free!

One of the most important add-ons which you can download free is practically another upgrade. PS1 lets you enter your flight into the RTE (route) page of the FMC (Flight Management Computer), for which purpose it obviously needs a database of the airway structures around the world. As the original database released with the 1.3 version is now out of date, especially in certain parts of Europe, an updated version has become available. PS1 is sold with only a limited subset of the world's airports' SIDs and STARs, and this same update addresses that problem too. It actually includes 516 airports, which is more or less all of those around the world which are capable of accommodating a 747, and 17,538 SIDs and STARs to go with them.

Observe and Learn

A popular feature introduced with version 1.3 is the ability to record and replay PS1 videos, in its own format. The simulator comes with a number of these, enabling the novice to observe while an expert carries out numerous basic and advanced procedures. Many more videos are available from the Aerowinx website, and they cover topics such as polar navigation, VNAV (Vertical Navigation), DME (Distance Measuring Equipment) arcs, and the paravisual display. Many other miscellaneous goodies are also available, even additional Dutch and English ATC accents to add to those already supplied. You can also find utilities for adding new airports and modifying the existing ones, a database of gate positions covering many thousands of gates throughout the world's airports for direct input into the FMC, and many subsidiary tutorials on subjects as diverse as North Atlantic tracks, stabiliser trim, and hydraulic systems.

Taxi!

Although taxiing is not normally a major issue in a systems trainer, it can be an important part of the experience for simulator enthusiasts. Because the 'scenery' provided with PS1 consists mostly of runways, taxiing with just the built-in visuals takes a certain amount of practice, and so another add-on lets you see the taxiways. This apparent magic is achieved by means of using ProController Sector files to draw a 3D view of the taxiways on top of PS1's lower EICAS screen. Although resolution differences between PS1 and Microsoft's Flight Simulator sometimes result in offsets, many still prefer to use this add-on to enhance the whole 'startup to shutdown' experience.

Squawkbox

Another popular addition for those with cheap Internet access is flying PS1 with online ATC from the Vatsim or IVAO networks, using an add-on called Squawkbox. Fly-ins have been organised when large numbers of both PS1 and Flight Simulator users have saturated the controllers in a given area, and these have provided lots of fun for all concerned - especially the controllers, who experience typical real-world levels of incoming aircraft with the associated stress levels (hey, it's only a hobby, guys!). In general it adds considerably to the PS1 experience to be guided throughout the flight by human ATC rather than an automated equivalent, although having said that, an intelligent ATC 'robot' is yet another planned PS1 add-on.

The PS1 Squawkbox is somewhat different from Microsoft's version, in that it simply sits invisibly in the background instead of actually appearing onscreen (PS1 already has VHF radio and a transponder).

So he thinks he knows all the drills, does he? We'll soon see…

An emergency descent during depressurisation - the pax won't be enjoying this

"Mummy, why does the rain smell like an airport?" Fuel jettison in action

Hydraulics problems. Alternate deployment of the flaps takes around six minutes

PS1 ADD-ONS AND EXTRAS

1.3a upgrade and some other add-ons: airline configuration files (docs and new ones), Visual744 and SceneryInjector (for linked Microsoft Flight Simulator), Accu-Weather, Dutch and English ATC accents, Taxiway, Airport Adder and EditAirport, FMC Gate database, Squawkbox747, Broker747, RoutePlan and FuelPlan (and a link to PS1FPLAN)

http://aerowinx.de/html/miscellaneous.html

New navigational and SID/STAR databases for PS1.3

www.tp1.physik.uni-erlangen.de/~vitzethum/ps1/navdata/

ACARS (and much, much more) by Jeroen Hoppenbrouwers

http://infolab.kub.nl/people/hoppie/ps1/

PS1FPLAN flight planner (ShareWare, under development)

www.ps1fplan.com/ps1fpl13.htm

Glideslope - a site devoted to PS1 additional material, which includes a 30-phase PS-1 training course (based on a real airline's transition training for the 747-400)

www.glideslope.de/

KLM 747-400 site:
www.villa.demon.nl/

PS1 SIDS and STARS for numerous airports

www.multimania.com/cbf/index.htm

Incoming messages are displayed in the outside view window in the same way as PS1's own ATC and ATIS text, whilst outgoing messages utilise an entry line triggered by a hot key. For those of you who use RogerWilco, tuning PS1's VHF radio to the new frequency causes everything to happen automatically; just click the transmit PTT button and talk to your next controller. The screenshot shows the desktop of the second networked PC (PS1 is running on the first), that is handling the online flight requisites, as well as a moving map presentation showing progress towards the destination.

The Broker

There obviously has to be a way of exchanging data between PS1 and bolt-on applications, in order to supply the necessary position and other information to online ATC, or to any other add-on, for that matter. This function is carried out by an add-on called the Broker, written by the prolific Mr. Hoppenbrouwers, who was also responsible for Squawkbox; it effectively acts as a telephone exchange for messages passing between PS1 and the outside world. This opens up a number of other interesting possibilities, and the prolific add-on developers of the PS1 community haven't been slow to take advantage of them.

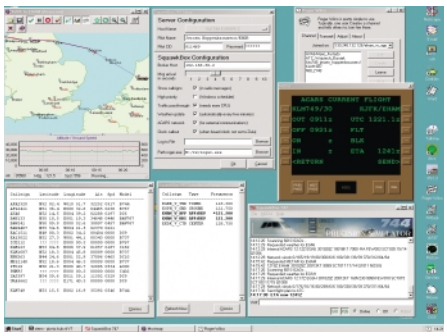
Weather and Comms

The Accuweather utility enables PS1 to replicate the current weather conditions prevailing in the Real World™, wherever you might be flying. As is the case with online ATC, this also requires an Internet connection so that you can obtain the relevant forecast data and then inject it into PS1 by means of the Broker.

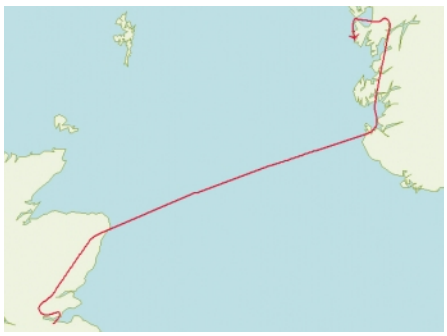
If you are flying online, then you can use the ACARS (Aircraft Communications Addressing and Reporting System) ground and communication stations to communicate with other online flyers, with the results displayed in PS1's ACARS. This is a relatively new development, which is expected to be useful for virtual airlines as well as having obvious benefits during those long hours in cruise. Another Broker-dependent utility that can add atmosphere is the Flight Crew add-on, which provides a variety of airport noises while you're on the tarmac, together with suitable cabin staff announcements at the appropriate moments during a flight. It's easy enough to extend this to provide random ATC chatter, for example, should you wish to do so.

Flight Planning

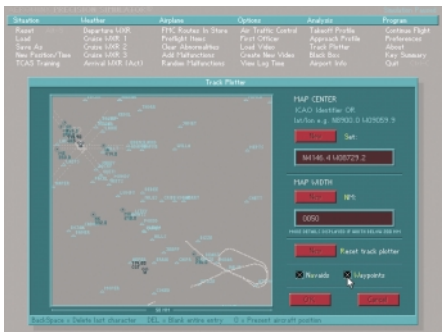
There are some flight planning applications specific to PS1, two of which are free, and one of which is shareware. Routeplan was developed for version 1.2, but is still widely used by PS1 enthusiasts as it enables you to build up a flight plan visually, seeing the waypoints on the map as you go. Following many pleas from PS1 devotees, the author is considering producing a 1.3 version of the program, although he also produced FuelPlan specifically for version 1.3; FuelPlan does know about Pratt & Whitney and Rolls Royce engines, but lacks the graphical elements of its older brother. If you really must have the ultimate in realism, consider the shareware PS1FPLAN. Written by a real-world flight dispatcher, this provides professional levels of detail about your route and fuel consumption.



Online flying, showing the Squawkbox configuration (PS1 is running on a second networked machine)



The MoviMap add-on shows your flight progress in real time - this one's approaching Bergen out of Edinburgh



The simple but effective Track Plotter, one of PS1's 'Black Box' facilities, shows your entire track since the last reset.

A Price Worth Paying?

PS1 is certainly different from most mass-market simulators. It's tempting to speculate that those who are attracted by its level of realism and concomitant complexity will probably not be fans of Microsoft's Flight Simulator, and vice versa, although there are many who claim to use both according to their mood. It is undoubtedly the level of support which comes with the product that is its most impressive feature, along with a technically high-powered forum and the availability of free add-ons of a genuinely professional quality. In the light of all this, many will consider the asking price to be worth paying. ■

Brian Cowell

Our special thanks to Hardy Heinlin and Jeroen Hoppenbrouwers for kindly contributing some of the visuals used in this article

A Real-World Simulation?

Please Mister... Can We Have a Go?

Flight simulators have definitely come a long way, not only in the realm of home entertainment, but also in the way in which they're used in the real-life training of commercial pilots. The popular view of a simulator intended for pilot training is that of a full-motion simulator, designed to replicate an aircraft's behaviour to such an extent that a pilot can walk straight from the simulator into the real thing and be able to fly it with their eyes closed. Particularly in the early stages of commercial training, however, this couldn't be further from the truth, but enough realism to replicate elements of an actual flight is certainly required. A high enough degree of realism, in fact, that time in a flight simulator can be used towards a full IR (Instrument Rating) and a full MCC (Multi-Crew Co-operation) course, both required for nearly all commercial pilots these days. The type of simulator used in these cases is a cross between a home PC setup and a full-motion simulator, and we took a trip to see one company in the UK who are glad they made the decision to buy one.

The ALSIM AL 200 MCC Flight Simulator shell

The Flight Centre

The Flight Centre is a flight training company based at Wolverhampton Business Airport (formally Halfpenny Green) in England; it's a growing training school, which is soon to be an airline, and provides students with aircraft and facilities from their three properties on the airfield. The Flight Centre is divided into both PPL and CPL training schools, enabling prospective pilots of either discipline to concentrate on their specific subject. The CPL side of the company has just invested in a state-of-the-art simulator which will be used to train pilots from all over the UK and, before too long, from Europe as well.

The Alsim AL 200

Having made the decision to expand their commercial training facilities, The Flight Centre bought an Alsim AL 200 MCC Flight Simulator. This will be certified for MCC courses, IR training, and multi-engine ratings. The AL 200 was designed principally for the final phase

of professional pilot training, and allows the MCC course to be completed without the use of an aircraft. This particular course consists of 25 hours of theory-based ground studies, and 20 hours of training in the AL 200. Students fly ten hours in the simulator as the pilot flying from the left hand seat, and the remaining ten on the other side of the cockpit as co-pilot.

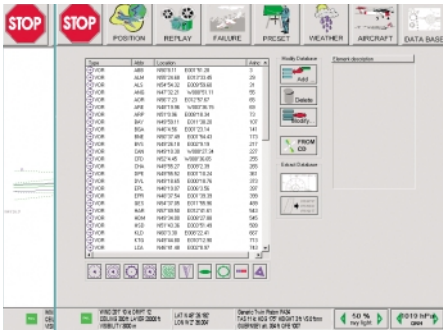
From the moment you first sit in the AL 200, you could be forgiven for thinking that you're really in a Seneca PA34; the look, feel and sound really are amazing. The simulator is a glass cockpit in which you can change the visual display to simulate a variety of different aircraft in the same static model, and is thus particularly cost-effective. The Flight Centre's own simulator can be configured for the PA34 Seneca and PA31T Cheyenne, with the flight models accurately replicating those of the real planes to such a degree that the transition from simulator to aircraft is virtually seamless. Having completed his IR training on the simulator, a student commented, "I found this simulator to be the most useful piece of ground-based training equipment I've ever used. It accurately represented the real PA34, allowing a full appreciation of what was required when flying the aircraft."

Mechanical or Computerised?

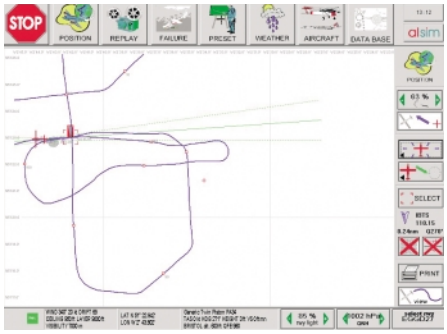
Alsim's AL 200 is a static simulator and, believe it or not, works on Microsoft's simple Windows 2000 interface. The 'brain' of the simulator runs on five PIII 800MHz processors, and is networked to provide optimum speed. The operating system itself uses a PII 350MHz that controls the whole flight programming process, and is operated by the instructor or examiner. If any faults should develop in the simulator, the manufacturers can access the computer via a modem link and fix the problem from the comfort of their base in France. Not only is this useful for dealing with problems, but all updates and scenery add-ons can also be downloaded from Alsim's HQ.

Just like many home PCs, the simulator uses the popular Voodoo 5000 graphics card to enhance the visual display and 3D effects during flight.

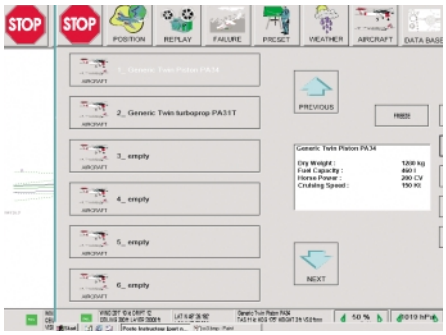
The visuals are based on information supplied by Jeppesen, with a database listing all the necessary airfield characteristics such as runway length, width and lighting. The most up-to-date ILS, VOR, DME and ADF information can easily be accessed from Jeppesen's own database, so avoiding the dreaded spectre of obsolescence. Specific scenery details, extra buildings, and real-life visuals can easily be paid for and downloaded from the manufacturer in a short period of time.



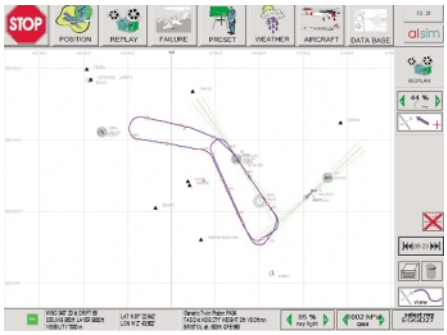
Uncluttered control panel - here with the Database screen displayed



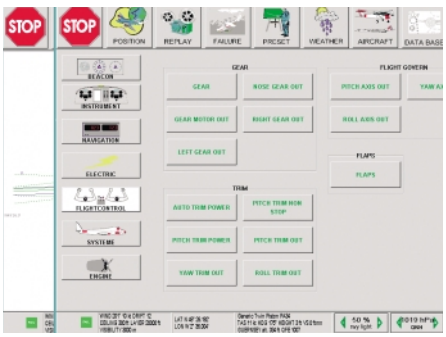
Map view - not to be confused with an Etch-a-Sketch



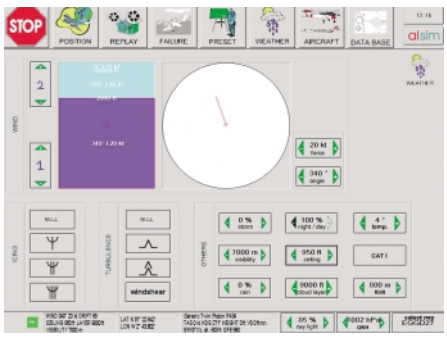
Less choice of planes than your average PC simulator



Replay feature - see what you did right...and where you went wrong



Disasters waiting to happen



Weather combinations available at the touch of a button

External view from the cockpit


The professionals show how it's done

Where do I sign up?

If you want more details of the Flight Centre's brilliant courses or even fancy blowing a few quid on a full-motion device for that spare corner of the shed, then a good place to start getting the information together is the relevant website:

The Flight Centre are at:
www.hgfc.co.uk

Alsim's site is:
www.alsim.com

"Heavy Rain and Gear Failure Please"

A good weather system is obviously a necessity, especially when the simulator is to be used for IR examinations. It's obviously impossible to conjure up different weather conditions for a flight in real life, but in the AL 200 you can simulate the very best or worst conditions that any pilot might face. There's even a facility for creating a CAT1 weather scenario with visibility down to 800m and a 250ft cloud ceiling. There is, however, no weather radar. The 3D surround sound adds to the realism, and all aircraft sounds have been recorded from the real article.

Alsim's software is based on a simple touch screen interface, which allows several failures in a flight to be simulated at the touch of a button. The instructor can set challenges in any number of ways - engine faults, autopilot failure, instrument problems, gear failure and so on. Any mishaps or disasters that might happen in the real plane can be reproduced in the ALSIM simulator.

The Professionals

So how does it compare to the real thing, and to Microsoft's Flight Simulator 2000? Before our turn in the hot seat, we sat back and watched two professional pilots fly the Cheyenne and deal with simultaneous failures on a flight to the island of Jersey. In the left-hand seat was Captain Nick Davies, Chief Pilot at the Flight Centre, CAA examiner, and a commercial pilot with command hours on the Boeing 737 and Cessna Citation. "The Alsim 200 is a quantum leap in flight simulator technology not previously accessible to commercial flight training schools", according to Nick, "and is the most advanced of its type available today."

Lee Hulme, a flight instructor and fully qualified professional pilot, was in the right seat. We nervously watched these two high-calibre professionals deal with life-threatening situations which were so realistic that you could see them both breaking out into a sweat under all the pressure. Even from the back seat it was heart-stopping stuff. Chief Flying Instructor Ron Liddiard would punch a button, fail several systems, and then examine every single movement and decision made by the crew. "It has a wide range of facilities and many different system failures can be simulated," Ron tells us, just in case he hadn't made this clear enough during the flight!

The Amateurs

It was now our turn to fly the Cheyenne on a charter flight from Wolverhampton Business Airport to Manchester. Nick took us through the basic operating speeds and procedures for dealing with failures, stressing that we should remember to concentrate on flying the plane if anything untoward should happen. After this full briefing Nick was to have the unenviable task of guiding us through the flight.

Take-off was uneventful, and we climbed to FL80 before levelling off and engaging the autopilot and flight director to take us directly to the MCT VOR. At first it was difficult to remember that we weren't in the real thing, such was the realism involved. That feeling of real physical flight is accomplished through electrically controlled Force Feedback using torque motors. During straight and level flight we were able to admire the panoramic visual display created by the 3D visualisation software system. This provides high-resolution graphics which create the illusions of texture and depth perception, as well as providing the real-time flying effect.

Problems...we knew it!

As we approached our destination the weather was looking fair, but during the descent we noticed that the altimeter and ASI were no longer functioning, and so the fun really began once we were given radar vectors for the ILS RWY 24R. The autopilot was disengaged on 4-mile finals and difficulties flying the plane in weren't helped by a 25-knot crosswind. On 2-mile finals we noticed a loss in power from the engine on the right, and things were getting serious. With no ASI, the 25-knot crosswind and an engine failure, this was never going to be a textbook landing. We did make it to the runway successfully, but it was certainly more of a crash landing than a controlled touchdown. By the time we stumbled out of the simulator we were nervous wrecks, wondering how we were ever going to afford to pay for the damage to a previously immaculate Cheyenne. Realism? You should have seen our faces…

If you're lucky enough to find £250,000 down the back of your sofa, you can enjoy an experience like this whenever you like. Sadly the AL 200 is a little out of range for the average flight simulator enthusiast, and not quite advanced enough for the major airlines, but for a growing commercial flight training school it's an ideal and cost-effective investment. "This is the most valuable and impressive piece of equipment I've ever seen," said a pleased Ron Lilliard, "It's a delight to work on it and students find it a valuable learning tool."

Even if for many of us a PPL must take second place to more mundane financial necessities, it's interesting to hear that the market in simulators such as the AL 200 is getting much more competitive as a result of advances in technology, which are helping to bring down costs for buyers. Now, if we all just club together… ■

Andy Moon

HIGH FLYERS IN THE LOW COUNTRIES

Dutch Flight Simulator Weekend
October 13-14, 2001

After the excellent time we had in Holland last year, we were sorry when events conspired against us to keep PC Pilot away from this gathering of the Dutch and Belgian flight simulator community, held at the Dutch National Aviation Museum's Aviodome in Schiphol Airport. It's interesting to note that local and national TV stations, and even four national newspapers, publicised the event. What chance of that happening in the UK? More than 2,000 people attended the show, where over 120 different organisations were present - flight sim clubs, cockpit builders, developers, VAs and more. The event is a great chance for people to meet, swap ideas, and take a look at how other enthusiasts are keeping themselves busy.

The main theme of this event was home-built cockpits and, as you'll see from the pictures, there were some stunning examples on show. Microsoft's ubiquitous Flight Simulator was much in evidence, but Fly!, X-Plane, and Falcon 4 in particular all had their followers in attendance. These Dutch gatherings are undoubtedly the premier European events for the flight sim community, and we guarantee that anyone making the trip to Holland will receive a genuinely warm welcome and come home with plenty of new ideas (and a severely depleted bank balance after they make the obligatory trip to the Luchtvaart Hobby Shop). For more pictures and a lengthy article about the event, go to the Aviation Museum's website at www.aviodome.nl/ and follow the links from there. ■

Mark Embleton

We'd like to say a special thank you to Jos Grupping and Francois Dumas for their help with the images for this article.

The Flight Simulator Club Belgium's A320 cockpit (note the overhead panel)

737 cockpit by Belgium's Virtual Flying School

Rotterdam-based TRC's Cessna panel - all gauges, switches and meters are fully functioning.

Seven monitors enough for you? Three for the views, and four for instruments

A320 project by Hans van Munster is shaping up well

Ron Norp's Cessna panel, built to practice for his flying lessons

AIRBAND RADIO

Flying for Talkative Pilots

Aircraft station box - VHF comm No.1 set selected

What do pilots say to controllers on the radio? What would happen if they didn't say it? Who else are they able to talk to? What can be heard on an aeronautical radio? What's that chap at the air show listening to through his earpiece, and can I try it too?

We are all aware of the existence of aeronautical radio, but few people realise that it can be listened to using readily available equipment. Any mention of airband radio immediately brings to mind ATC (Air Traffic Control). For most people, this conjures up an image of a controller watching the flights in their area on a radar screen, and issuing precise instructions so that the aircraft under observation can proceed safely without crashing into each other. Or at least that's the impression given by news reporters every time they hear of some supposed mishap. Much of aviation isn't like that at all, as we know, yet radio has an important role to play in ensuring safe and efficient flying.

Is aeronautical radio important? Just imagine life without it - pilots would receive no helpful instructions for avoiding collisions and for guidance; they wouldn't be able to call for help in an emergency; air shows would be chaotic as participants wouldn't know when the previous aircraft is clear and it's their turn to display; formations of aircraft wouldn't be able to co-ordinate their displays at all. Airliners would be unable to talk to their operations departments to resolve technical hitches, minimise delays, and obtain any special needs for passengers; there'd be no warnings of bad weather without the benefit of a broadcast weather report, and radio aids to navigation would be non-existent. All rather a disadvantage!

Aviation, Navigation, Communication

The immediate priority during a flight is to keep the aircraft under control and to

Cockpit radio controller set to Heathrow No.1 director

avoid crashing into terrain or other aircraft. In the most dire emergencies, aviation and navigation are what the pilot attends to first. Communication via radio is usually next in the list of priorities. Radio navigation aids (colloquially known as beacons), which provide navigational guidance, rely on radio as well, so we can divide airband radio into two categories: communications (com) and navigation (nav). Most aviation enthusiasts are more interested in communications, but don't forget that beacons can also be picked up on suitable radios and so deserve consideration.

The air show is the most visible introduction to airband communications for many of us. Here the ground operator will have some responsibility for what goes on, but is unlikely to be a controller. There probably won't be radar and the ground operator can only advise pilots, not enforce binding instructions. This would certainly be the case at a smaller airfield. Pilots usually talk to an air/ground operator by calling up the airport radio station by name. The operator will then inform pilots about other known traffic, weather conditions, and which runway is in use, but cannot issue orders.

On the day of the show, a more qualified operator known as an AFISO (Aerodrome Flight Information Service Officer) offers an AFIS (Aerodrome Flight Information Service), and pilots will call, for example, Cambridge Information. Although their role is not very different from that of the air/ground service, the AFISO may give orders to prevent collisions when aircraft are taxiing on the ground, and may pass on clearance for a plane to join more strictly controlled airspace after take-off, once the AFISO has first telephoned a proper ATC centre to obtain this clearance.

At a nearby airport the ground movements controller is responsible for instructing aircraft on the ground as to which routes they must take when taxiing between the terminal building and the runway. The airport is fully controlled, with suitably qualified staff able to give orders to pilots. The ground movements controller is also qualified for aerodrome control, known to pilots by its call sign of Tower. This controller has sole charge of the runway. No aircraft (or even operations vehicles) enter, taxi, take off from or land on the runway without express permission from the tower.

Soon after take-off, flights leave the controlled airspace zone around the airport and climb into a larger controlled area. Tower will hand over the flight to another controller - a qualified radar controller at the National En Route Centre. Probably located nowhere near the airport the plane has just left, this high-tech building contains a windowless hall where the radar controllers sit at screens. The actual radar aerials might be positioned anywhere in the country, as might the radio masts which communicate with pilots. Dedicated landlines bring the radio and radar information into the Centre.

When Flight PCP121, for example, is waiting to take off from the airport runway, the ground movements controller telephones the Centre on a dedicated line, then the radar controller answers and says that they can accept the flight into the airspace sector which they are controlling. The ground movements controller can then give the flight its take-off clearance. Once airborne, the pilot will be instructed to change frequency, whereupon he'll find himself speaking to the radar controller, who will give orders that enable (as the professionals say) the safe, orderly and expeditious passage of Flight PCP121 and any other aircraft in range of their radar.

The tower at Southampton. Now you know what they're up to in there

What The Law Says

Listening to broadcasts and amateur radio enthusiasts is allowed, but there is no dispensation for the airbands. The Wireless Telegraphy Act of 1949 and the Interception of Communications Act of 1985 spell out the letter of the law, but the official line is that what you listen to in your own home (or through your earpiece) is up to you, and providing you keep it to yourself, it's unlikely that you'll find the Flying Squad turning up on your doorstep with an espionage warrant.

A typically functional and comfortable aeronautical grade headset

AOR's AR 8200 - small, state-of-the-art, and portable

ATIS and VOLMET

There's plenty more to the airbands than this, however. Before Flight PCP121 took off, the pilot would have listened to a weather broadcast that is transmitted at low power for everyone in the immediate vicinity of the airport to hear. Called ATIS (Automatic Terminal Information Service), this is a recording of a voice not only reading the weather, but also providing vital information such as which runway is in use. Every airport has at least two runways; even a single strip of concrete can be traversed in either of two directions.

A pilot can also tune in to various types of navaids (radio navigation aids). These cause instruments in the cockpit to show indications of compass bearings or distances; there are also beacons which guide an approaching aircraft towards the runway. As well as triggering the correct display on instruments, beacons transmit their own audible identification as a few letters in Morse code. The transmission is slow, repetitive and easy to decipher, even if you have to look up each character in a decode table. As ATIS is a low-powered broadcast, it is sometimes mixed with the signal from a nearby beacon, so that pilots can listen to it from further away while, at the same time, they tune into the beacon for guidance.

While airborne, the pilot will want to know that the weather at destination hasn't deteriorated. A different, higher-powered, recorded voice broadcast is VOLMET, which stands for VOLume METeorological broadcast. These broadcasts run through a sequence of reports for a succession of aerodromes, returning to the beginning of the broadcast once the recording has played all the way through.

Note the difference between a transmission and a broadcast. When a flight is told that it is "Clear take-off", this is a transmission of information or instructions addressed to that one particular aircraft. When a recorded weather report plays continuously for all to hear, that's a broadcast.

The hardware

Nearly everything described above happens on a waveband in the VHF (Very High Frequency) part of the radio dial. You know how these transmissions behave because stereo broadcast radio (actually on Band II) is nearby. It's possible to receive these signals using a metal rod aerial about the length of your arm, but the signal has to be relatively local. You won't hear VHF transmissions from all over the world.

Imagine a Band II radio with an old-fashioned pointer that moves along the dial. On the left you have Radio 2, in the middle Classic FM, and further right some local stations. Frustratingly, if only you could wind that pointer past the right hand end of the scale, you'd hit the VHF airband; it's the very next band along from the stereo broadcasts.

As a domestic stereo set won't allow you to access the airbands, a specialised set is needed. Simple radios, which technologically are no different to a cheap portable broadcast transistor set, do exist. Tuning accuracy is compromised because of their dial pointers, and they can only cope with strong, local signals. One of these might suffice if you just need to

Interested?

If you fancy having a listen to what's on the airbands, there's a huge range of receivers/scanners available, from around £70.00 upwards. For a good range of available equipment, take a look through the advertisements in Short Wave Magazine (www.pwpublishing.ltd.uk/swm). The magazine also provides useful information and reviews, and their book store at www.pwpublishing.ltd.uk/books (tel: 01202 659930) can supply all the handbooks and frequency guides you might need. A few handy books which won't break the bank are:

Airwaves 2001 (Photavia Press)

Aircraft Radio Frequencies and Guide Book (Ian Allan Publishing Ltd.)

Air Band Radio Handbook (David J. Smith)

The author recommends The Europe and Middle East En Route Supplement (available from Thales Aerad (tel: 020 8946 8011).

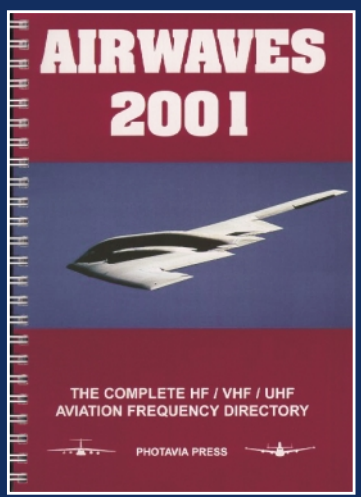


photo: Christine Mlynek

The Author

Dr Godfrey Manning has written numerous articles on airband radio for Short Wave Magazine and many other publications. He is the curator of a technical (rather than historic) aircraft museum in London, and also holds both a pilot's and a ground operations radiotelephony licence.

Discone aerial - tell the neighbours it landed there one evening

monitor a small aerodrome that only has the one air/ground or AFIS channel.

With silicon chips being so advanced these days, more sophistication is possible. We're now in the era of scanning receivers with keypad channel selection and LCD screens that show you what you're listening to. Equipment like this features precise tuning and is more sensitive in its reception of weaker signals; not surprisingly, it costs more than simple sets. The pictured AR 8200, made by AOR, is a state-of-the-art general purpose scanning receiver (known confusingly as a scanner). It features its own attached aerial, this time a rubberised arrangement rather than a metal rod.

The more complex receivers usually have detachable aerials. For receiving long-range signals an outdoor aerial is necessary, and should be mounted as high as possible (depending on safety constraints and how well you get on with the neighbours). A useful all-purpose aerial of this type can be seen in the picture; it's called a discone, as some of its metal rods are arranged in a pattern as if laid out on a disc, while the other rods are in the shape of a cone. Best quality coaxial cable is needed to bridge the great distance from the aerial to the receiver.

A frequent question

What's the frequency? Well, if you knew that Radio 2 can be heard on 89.1 then you'd have no trouble tuning in to this station. This number is actually the frequency in megahertz (MHz) and is the method by which the required station is selected on a receiver. Aeronautical frequencies are available in published form so, for example, the ATIS at Edinburgh is given as 131.35MHz. If you were near the airport and set this frequency on the dial (or the digital display) of a VHF airband or scanning receiver, you'll hear the recording if it's being broadcast. Aircraft receivers are a little more sophisticated, as you can see in the photographs.

VHF airband com frequencies are in the 118-137MHz range, but a good receiver should also cover 108-118MHz, as two types of navaid are found between these frequencies. Most military traffic is found on even higher frequencies, known as UHF (Ultra-High Frequency), although they're largely confined between 220-400MHz. A good scanner will cover the lot.

VHF/UHF signals cover only limited distances, so how do controllers talk to long-haul flights over regions such as the Atlantic? Lower frequencies actually travel further, and some people refer to these as the 'short waves'. Technically they are HF (High Frequency), and are found at about 2-30MHz. You'll need a separate receiver for these, and you won't get away with just a portable aerial; some elaborate wires strung along the garden are more appropriate.

You probably want to know the meaning of all the chat between pilots and controllers and how navaids function, and we'll hopefully be looking at that in another issue. Airband radio makes for fascinating listening, but have a quick read of the legal aspects first - we don't want you to end up on the wrong side of the law! ■

Godfrey Manning

Flight Sim Training

Professional instruction with Bill Stack

BEFORE YOU START

A few prudent practices that professionals normally apply can make your flights as realistic as possible. The background will also help you enjoy flying while you learn.

OUR FLIGHT AND AIRPORTS

Today's 130-mile (240-kilometre) tutorial will take us from Norwich to Rotterdam, Holland. Norwich is a small general-aviation airport that we landed at in tutorial 11 (July/August 2001). Rotterdam is a commercial airport in southern Holland. During our flight across the North Sea, our instruments will go awry. This failure will force us to navigate to Rotterdam without radio navigation aids and use a visual approach in low visibility at the airport. Those simmers who dismiss visual flying as too easy will find additional challenges today to test their flying skills.

OUR AIRCRAFT

We'll fly our Mooney Bravo again for this tutorial. It's an easy aircraft to fly, and it gets us to our destinations in about 25% less time than the Cessna 182s. In the Bravo, this 130-mile flight will take about 50 minutes. You're welcome to fly this route in another aircraft type after flying it with us in the Bravo.

NAVIGATING WITHOUT RADIOS

Pilots and flight simmers alike can get too dependent on their radio navigation aids, and those aids can fail just like any other device. Without them, pilots must rely on age-old navigation techniques and assistance from air traffic control. For these reasons, every instrument pilot should know how to navigate without radios and approach an airport visually in marginal weather.

THE CHARTS

Be sure to familiarise yourself with the Jeppesen charts we will use for these tutorials before embarking on this flight so you will know what to do aloft. These charts show the flight path, fixes and navigation aids. As well as the charts reproduced from the Jeppesen Sim Charts program that you'll see in this tutorial, we've included high resolution images of recent Jeppesen charts on the cover CD. For more information see page 10.

USE FLIGHT PLANS

You are free to use paper plans or an electronic flight planner. Paper plans are a bit clumsy to make but easier to use aloft. Electronic plans are easy to make, but using them aloft requires following submenus that disrupt the simulation.

In lieu of filing your flight plan with ATC as real pilots do, imagine that you have filed in accordance with regulations. Keep your flight plan handy throughout the flight so you can easily refer to it. After your flight, file it in a folder or loose-leaf notebook.

NOTE THE TIME

We always jot down the time of significant events during our flights, and we recommend your doing this, too. Note the time of take-off, the time of passing significant fixes and navaids, and the time of arriving at the destination airport's instrument approach procedures.

COMPENSATE FOR WIND

Be sure to account for winds in your plan, because deviations from your desired course will consume additional fuel and delay your arrival. Our issue 4 tutorial explains wind compensation in detail.

MONITOR YOUR PROGRESS AND STATUS

Throughout your flight, check your instruments for the status of your aircraft and engine. Frequently check your position, radio navaids, time/speed/heading and/or GPS. Monitor your engine-temperature, oil-pressure, fuel-flow and fuel-supply gauges. Correct as necessary to maintain desired course, altitude and performance levels. At the end of the flight, compare your estimates to the actual performance in time and fuel consumption.

AIR TRAFFIC CONTROL

With the addition of air traffic control in Flight Simulator 2002, we'll be giving more ATC guidance in our tutorials. Today's flight from England to Holland will take us through moderately travelled airspace between Great Britain the European continent. Moreover, we'll land at a controlled airport where no procedures can be performed without ATC clearances (except in emergencies). If you don't have ATC in your sim, pretend that you are performing the recommended ATC communications.

FLY ONE STEP AT A TIME

While leaping over the basics and plunging into advanced flights is a great luxury of flight simulation, it is not realistic. Real pilots do not start at the end of the training course and work backwards, because it deprives them of the skills needed for meeting subsequent challenges. When flight simmers try to meet challenges for which they are unprepared, they frustrate themselves with poor performance and errors. So we strongly advise doing everything one step at a time and building your skills toward the next levels, just as real pilots do.

USE THESE TUTORIALS FOR FLIGHT-SIMMING ONLY

These tutorials are intended for computer flight simulation games, not for real-world aviation or real-world flight training. While making our tutorials as realistic as possible, we have adapted them out of necessity to the limits and nuances of flight simulation, so some aspects cannot and do not apply to real-world flight. Therefore, we caution everyone to use these tutorials for their intended purposes, and we accept no liability for anybody's misuse of them.

OUR AUTHORS

Bill Stack is an expert flight simmer and author of several popular flight sim books. Nels Anderson, our technical consultant, is a certified pilot and president of flightsim.com

Learn more about flying like a real pilot from Bill Stack's flight sim books at www.topskills.com/flitsim.htm or contact TopSkills in Tennessee on 865-584-7340.

REFER TO OUR PRIOR TUTORIALS

For space considerations, we will not repeat common aspects in every tutorial. If you don't have our previous tutorials, back issues are available from PC Pilot – visit www.pcpilot.net. Issues 1, 2 and 3 are now sold out, but we've re-published them in CD format, together with Tutorials 1-8. This is great value with prices from £7.99. We'll be publishing further issues on CD as they sell out. For more details see our subscriptions page or the website.

Issue 1 Taking off, flying straight and level, flying traffic pattern, landing, simple ILS approach. London City (circuit)

Issue 2 Cross-country flight, VFR pilotage, IFR radio navigation, using SIDs, STARs, IAPs London City – London Stansted

Issue 3 Attitude flying, VFR dead reckoning, IFR NDB Approach London Stansted - Birmingham

Issue 4 Wind compensation, VFR with radio navigation, IFR VOR/DME approach Birmingham – Dublin

Issue 5 VFR scenic coastal flight, IFR fixes, holds, procedure turn, ILS approach Dublin – Glasgow

Issue 6 Night flying Glasgow – Manchester

Issue 7 Global positioning system Manchester – London Heathrow

Issue 8 Fuel calculation Heathrow – Cork

Issue 9 Flying a back course – Hanscom to New Bedford

Issue 10 LDA Approaches - New Bedford to Brainard

Issue 11 Using a DME-ARC Approach – Humberside to Norwich

Issue 12 Using airports of differing elevations – Blackpool to Leeds-Bradford

Issue 13 Mountain flying – Hartford Connecticut to Pittsfield Massachusetts

FLIGHT SETUP

Prepare your simulator for your flight. It takes only a few minutes and makes your flight more challenging, more realistic and more fulfilling.

GET YOUR WEATHER BRIEFING

When we began writing this tutorial in October, Europe was enjoying delightful autumn weather. Temperatures in England and Holland were around 10°C (50°F) overnight and around 15°C (60°F) in the afternoon. Rainy days and sunny days were common. To ensure instrument conditions, we'll use cloud cover that will block our views of terrain for most of the flight, so set your weather as shown in our weather tables. Later, you are welcome to use actual current conditions for this route.

Today's Weather at Norwich

Visibility:	10 miles
Wind:	11 knots from 140 degrees
Clouds:	Cumulus, scattered 4/8, Ceiling 2,500 MSL, Top 5,500 MSL
Precipitation:	None
Temperature, dew point up to 3,000:	62°F/16°C, 53°F/12°C
Temperature, dew point up to 6,000:	47°F/08°C, 38°F/03°C
Temperature, dew point up to 9,000:	32°F/00°C, 23°F/-05°C
Temperature, dew point up to 12,000:	17°F/-09°C, 08°F/-14°C
Temperature, dew point up to 15,000:	-13°F/-25°C, -24°F/-31°C
Pressure:	30.03

Today's Weather at Rotterdam

Visibility:	5 miles
Wind:	10 knots from 200 degrees
Clouds:	stratus, broken 6/8 Ceiling 1,500 MSL, Top 5,000 MSL
Precipitation:	None
Temperature, dew point up to 3,000:	66°C/19°C, 56°F/13°C
Temperature, dew point up to 6,000:	51°F/10°C, 41°F/05°C
Temperature, dew point up to 9,000:	36°F/02°C, 26°F/-03°C
Temperature, dew point up to 12,000:	21°F/-06°C, 11°F/-12°C
Temperature, dew point up to 15,000:	-13°F/-25°C, 24°F/-31°C
Pressure:	30.09

Making this flight during daylight or at night is your choice, because there is no practical difference for instrument flights. To fly at night, refer to our issue 6 tutorial for details of night flying. To make the flight a bit more interesting, try taking off before dusk or dawn so light conditions will change en route.

PREPARE YOUR AIRCRAFT

Be sure to prepare your aircraft for flight before taking off by setting your radios and gauges and turning on your lights. The following conditions generally apply to most flights. For this flight, choose the Mooney Bravo, preferably the IFR version. All our time estimates are based on this aircraft. Because the 11-knot wind at Norwich is from 140, the best runway for taking off is 09. Start your flight at the take-off point of runway 09.

Calculate your fuel needs and carry enough for this trip, using the aircraft's average fuel-flow rate plus legal requirements to determine the amount of needed fuel. Remember that our Mooney Bravo uses about 16.5 gallons of fuel per hour from take-off to landing and we must include enough to reach an alternate airport and remain aloft for an additional 45 minutes. Our estimate is more than 20 gallons and less than 30 gallons. What's yours?

SET UP YOUR AIRCRAFT

Make your aircraft ready for your flight. 'Buy' enough fuel based on your fuel calculations. Your fuel mixture should be rich, and your propeller pitch should be low at these low altitudes. The cowl flaps should be fully open while on the ground and during take-off and climbout. The carburettor heat should be off, because it is not needed and its use will reduce performance when the best is needed. The pitot heat won't be needed unless the temperatures are below freezing and there's moisture in the air.

TUNE YOUR RADIOS

Although you can rely on your GPS for navigation, you still need your conventional radio navaids for airport operations and as a backup during the enroute portions. Set your Nav-1 and Nav-2 radios and your OBI for the first frequencies and radials you will use.

SET YOUR GPS

Engage your GPS by displaying it on your screen, then check the displayed course to be sure it reflects your desired flight path. Don't worry about SIDs, STARs or IAPs, because the Microsoft GPS does not reflect them. Set the map for 'north up', 'course up' or 'track up', whichever you like best.

As usual, pilots should know how to use the GPS devices in their simulators; that is, how to engage the devices, change view screens, select data and so forth. Read your manual for instructions.

SET YOUR GAUGES

As standard procedure, set your altimeter for local barometric pressure.

PREPARATION CHECKLIST

(This checklist is for these tutorials only, and is not intended to be complete.)

Aircraft Settings

Engine:	running
Fuel supply:	adequate
Fuel mixture:	richest
Propeller pitch:	highest
Cowl flaps:	open fully
Wing flaps:	10% (specified by Mooney)
Carburetor heat:	off
Pitot heat:	as needed
Rudder:	straight
Ailerons:	neutral
Elevator trim:	neutral

Gauges

Altimeter:	local pressure
Amperes:	neutral
Vacuum:	green
Oil pressure:	green
Fuel pressure:	24 psi (specified by Mooney)

Radios

Com-1:	124.25 (Norwich Tower)
Com-2:	123.4 (Marham Approach)
Nav-1:	110.4 (Rotterdam RTM)
Nav-2:	116.5 (Coltishall CSL)
OBI-1:	115/295
OBI-2:	115.295
ADF:	not needed

GPS

Map view:	on
Orientation:	as desired
Zoom level:	as appropriate
Plotted course:	as filed
Displayed:	as needed

Lights

Beacon:	ON
Strobe:	ON
Position (navigation):	ON
Landing:	ON
Taxi:	ON

Clock

Local time or your choice

Make a Flight

After you've set up your aircraft, make a flight so you can bypass all these efforts on repeat flights of this tutorial. Name your flight 'Norwich EGSH 27 TO Bravo.' In the description box, enter 'Taking off from Norwich (EGSH), for Rotterdam (EHRD), in the Mooney Bravo for PC Pilot tutorial 14.'

IFR (Instrument Flight Rules) Tutorial *Part 14*

Falling Back - using the basics when technology fails

Today's European flight challenges us by combining instrument-flight with visual-flight skills. Somewhere during our flight, our radio navigation will fail, forcing us to use other methods to arrive safely at our destination. This 130-mile (240-kilometre) flight should take about 50 minutes from take-off to landing.

For users of Microsoft Flight Simulator 2002, ATC will give you more things to do and keep you busy during the mundane en route portion of the flight. Other simmers should mimic the communications when and where appropriate. Remember that nothing would be done at these airports without ATC clearances unless communication radios were inoperative.

YOUR FLIGHT CHARTS

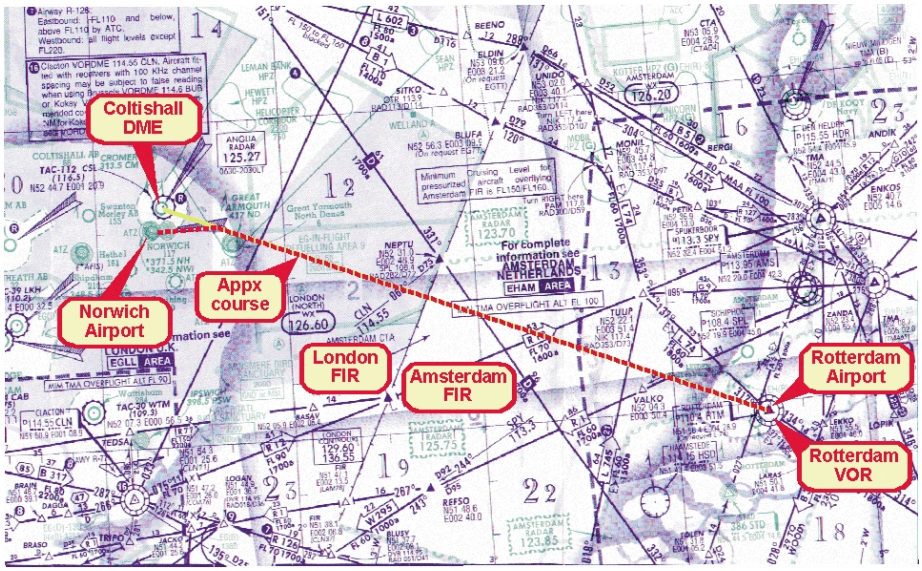
The charts for today's flight show the instrument procedures for all its portions: 1) departing Norwich Airport (EGSH); 2) flying over the North Sea from England to Holland; and 3) approaching Rotterdam Airport (EHAM). Familiarise yourself with all relevant aspects of these charts before taking off so you won't have to fumble around en route trying to figure them out. Because some of the instrument procedure charts are not to scale, the courses depicted on them are not precisely drawn. On these charts, follow the textual directions and use the graphical depictions for comprehension only.

Departure

Norwich Airport does not provide standard instrument departure procedures. Therefore we will fly straight out for about five minutes and intercept our course, which is the line between Coltishall VOR (CSL, 116.5) and Rotterdam VOR (RTM, 110.4). Then we will turn right about 25 degrees and follow the 115-degree course toward Rotterdam. Our en route portion will begin as soon as we depart Norwich airspace.

En route

The en route chart shows no airways between Norwich and Rotterdam, so we will simply follow the line that intersects CSL and RTM. With much of our flight being over the North Sea and the low elevations of England and Holland, we have no high terrain to worry about. On a flight lasting 50 minutes, we can climb to a nice cruising altitude of about 13,500 feet (4,118 metres) MSL and maintain it for about half the flight.



IFR flight path Norwich to Rotterdam

Approach

With winds at Rotterdam coming from 200 degrees, we'll benefit from a left headwind by landing on runway 24. Also, Rotterdam has an ILS approach for runway 24. The approach chart shows a procedure turn, which we've done a couple of times in earlier tutorials. To use this approach, we'll simply fly to RTM, then turn left and head away from the airport at 059, then turn around and head back to the airport at 239.

PLAN YOUR FLIGHT

Based on these charts, lay out the course you will fly from Norwich to Rotterdam. Include the relevant airways, navaids, intersections and fixes shown on the charts. We'll use Amsterdam Schiphol as an alternate, which is required for all IFR flight plans.

You are free to use traditional paper charts and flight plans or Microsoft's electronic flight planner. Paper charts and flight plans are still useful for seeing our course and estimated times at a glance. The electronic flight planner works with the GPS. If you use it, the GPS will show the course you plotted. You might try the flight once with electronic flight planning and once without for the different experiences.

IFR flight plan

Enter the following data on your flight plan, whether paper or electronic:

Departure: Norwich, England (EGSH) Runway 09

Arrival: Rotterdam, Holland (EHRD) Runway 24

Alternate: Amsterdam, Holland, (EHAM) Runway 19L

Waypoint: Coltishall VOR (CSL)

Waypoint: Rotterdam VOR (RTM)

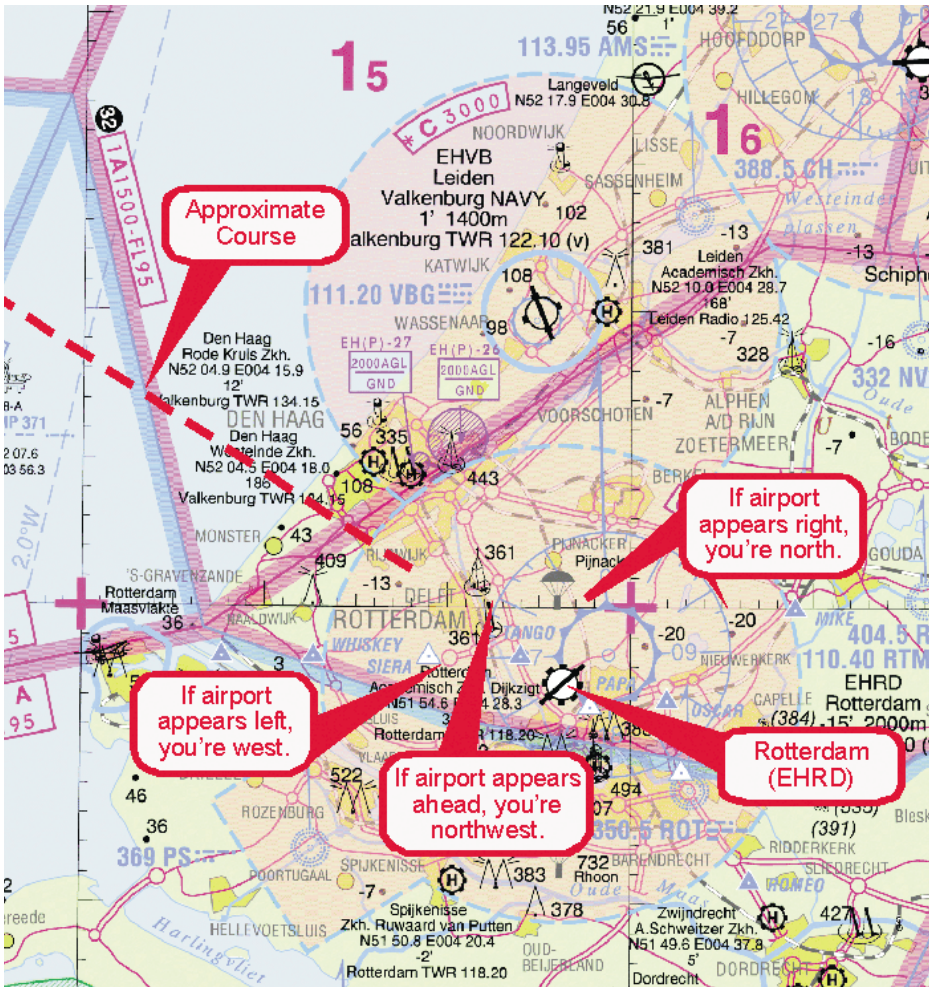
Altitude: 13,500 feet (4,118 metres) MSL

BEGIN YOUR FLIGHT

After you have prepared your aircraft, your cockpit and yourself for this flight, contact ATC and request clearance to take off. Again, for those without ATC features, imagine these contacts and clearances.

TAKE OFF

As soon as you receive take-off clearance, set your transponder for the assigned squawk code and begin your take-off roll promptly. Enter 6417 if you don't have ATC; it's a code ATC gave us on one of our flights. Don't dawdle after receiving take-off clearance, because safe traffic control relies on pilots following through and conducting themselves as controllers and other pilots expect. Do not take off



VFR flight path at Rotterdam

without proper clearance, as it will throw control of the airspace into disarray and bring ATC's wrath upon you.

Check your engine instruments during your take-off roll. The Bravo's manifold pressure should be at or above 38, and the oil pressure should be at least 24. The Bravo should lift off at about 60 to 65 knots. (Different characteristics apply to other aircraft.) If your aircraft isn't performing normally, abort your take-off.

During take-off and climbout on this flight, you will have a combined headwind and crosswind from the right. After changing heading to follow our chosen course, you will have a headwind from just right of centre. Adjust your pitch to maintain about 85 knots during your climbout. As you're climbing, adjust your cowl flap to keep your engine temperature in the green range - not too hot or too cool.

After your initial climbout, your Bravo should be able to climb easily at 700 feet per minute and 120 knots. Retract your flaps when your airspeed reaches 90 knots.

Soon after lifting off, you should receive the DME and audio signals from CSL. Being closer than five miles from Norwich, Coltishall, where the DME is located, is visible from a couple of hundred feet above Norwich in clear weather.

DEPART NORWICH

Without a departure procedure, we have no prescribed climb rates. Conveniently, we can head straight out toward our course. So after climbing out, continue climbing steadily at about 750 feet per minute towards our cruising altitude of 13,500 feet MSL.

Be aware that some ATC communications do not concern you or your aircraft. They may be for other aircraft flying in the area or communicating with the same controllers using the same frequency you are using. Follow only those communications that apply to you, and disregard the others. Use the "say again" feature whenever you're not sure of what you heard.

A few minutes after taking off, the airport tower will hand you off to appropriate ATC. A handoff is transferring an aircraft's radar identification from one control airspace to another. In this case, your first handoff will be to Norwich approach. Soon after you'll be handed off to Marham approach, then to North Denes approach. Eventually, you'll be handed off to Coltishall Centre, then Amsterdam Centre, and finally to Rotterdam approach. If you're not using any ATC features, imagine these handoffs as you fly along.

NOTE: A couple of times in our many test flights of this tutorial, ATC instructed us to head 045 after taking off, then "resume own navigation." Such instructions unfortunately foul up our tutorial and they were not received on every flight. For the sake of this tutorial only, please disregard ATC instructions to turn after taking off, which would never be tolerated in the real world.

If you use Microsoft's electronic flight planner, the GPS window shows your course to the destination airport. Simply follow the green course line. If you are using GPS but not the course plotter, maintain your 115-degree heading from CSL and towards RTM until you see RTM on your GPS screen, then head straight for it.

While GPS makes navigating and plotting very easy, it also eliminates the challenges that make these flights interesting. So to avoid the likely boredom, try relying on common radio navigation methods for maintaining your course and plotting your positions en route. You can use the DME features of CSL and RTM to help track your position en route, or you can use the age-old time/distance/speed method.

FLY EN ROUTE

Three or four minutes after leaving Norwich and gaining sufficient altitude (about 3,000 feet), you should receive the RTM's signal. It should be ahead and to your right as we climb out of Norwich. Because CSL is a DME not a true VOR, it has no radials and is therefore of limited use for course plotting. We can use it to know how far we are from it, but not where we are in relation to it, without triangulating from another navaid. Therefore, we'll use RTM to navigate towards Rotterdam Airport.

Five or six minutes after taking off, you should intercept the course between CSL and RTM. When the OBI-1 needle, which you already set for 115, begins closing, you're about to intersect the course, so turn right at this time and head 115. If you can see any terrain below, you should be near the North Sea coastline. Write down the time that you turned and entered this course, because you will need that information later. Notice also that this intercept point is about 112 miles from RTM per DME (it might vary a mile or two depending on your track from Norwich to here).

Once you're headed 115, edge your aircraft left or right as necessary to align with RTM's 115/295 radial. Your altitude should be around 6,000 to 7,000 feet (1,830 to 2,135 metres) MSL when you intercept this course, so continue climbing while turning right.

Your headwind en route will push you slightly off course towards the left, and it will slow your ground speed by 11 knots, so monitor your position en route and stay on course.

Remember from previous flights that your engine will behave differently at various

altitudes. The higher it gets, the less oxygen it will have for combustion, so you will need to adjust the fuel/air mixture to compensate. The engine will not perform well at all otherwise. The engine is performing best when the turbine inlet temperature (TIT) gauge reads between 1600 and 1700, so adjust the mixture so the TIT is within this range. Do not exceed 1750. Again, these performance readings do not apply to other aircraft.

Icing could happen in these crisp autumn temperatures. Remember that some of the higher altitude temperatures are below freezing, and you will be flying through some clouds on the climb out of Norwich and the descent to Rotterdam. Check your outside air temperature gauge to know whether icing could be a problem, especially at higher altitudes.

Conserve fuel by changing the propeller pitch at higher altitudes. Our Bravo cruised easily at 170 knots and used 15.50 gallons of fuel per hour with the following engine settings: RPM 2,100, manifold pressure 34 and TIT 1,600. If your engine is using fuel too fast, you could run out of fuel short of your destination. Adjust your settings until your airspeed and fuel-flow rates are best.

Paying attention to your progress and status is always important regardless of the flight's length. You could easily pass important waypoints if you were distracted, sightseeing too much, or fumbling with charts. About 20 minutes after taking off, you should climb through 10,000 feet (3,050 metres) MSL. You may turn off your landing light when you pass through this altitude.

Cruise En route

Once you have attained our 13,500 feet (4,118 metres) MSL cruising altitude, you may engage your autopilot or maintain altitude and heading manually with your elevator and rudder trims. Using autopilot relieves repetitive tasks, but being relieved of things to do makes the flight boring. Be sure your cowl flaps are closed whenever cruising. They are not needed, and they increase drag.

There isn't much to see over water bodies such as the North Sea, and about half your view is blocked by the 50% cloud cover anyway. So about 15 or 20 minutes of your flight is going to be rather boring. Keep your aircraft on course and at the proper altitude.

About halfway to Rotterdam, you will exit London FIR (Flight Information Region) and enter Amsterdam FIR. This basically means you will leave the auspices of British ATC and come under the auspices of Dutch ATC. At this point Coltishall will hand you off to Amsterdam. Be sure to acknowledge this handoff and change your transponder to the newly assigned code.

Cruising in the yellow zone of your airspeed indicator is all right if there is no turbulence. Abrupt manoeuvres are prohibited at these speeds, but straight and level flight is no problem in calm air. If you experience or expect any turbulence, keep your airspeed in the green zone. By the time you will make sharp turns for the airport approaches, your airspeed will be well within the green zone.

If you would like to fly visually for a while, our cruising altitude is high enough above clouds to qualify. To switch, notify ATC of your intentions and wait for their acknowledgement. But without visual references from the North Sea, pay close attention to your track along our course and adjust as necessary to stay on course.

Instrument Failure

Uh-oh! Navigation radio failure! Who knows what happened, but the OBIs, ADF, GPS and communication radios are not working. Without our radio navigation aids, we can't determine where we are and without communication radios we can't get any help from ATC. It can happen to any real-world pilot, and it's happening to you! From here on, you must rely on other navigation techniques.

To simulate this condition, cover both OBIs and your ADF with small slips of paper, and disengage your GPS and communication radios as though they didn't exist. This closely resembles how real-world flight instructors simulate instrument failures for their students.

The required procedure during loss of communication radios is to proceed on the filed flight plan and land as usual. ATC recognizes that an aircraft adhering to a filed flight plan but not responding to radio contact has probably lost communication capabilities. This is one of the reasons ATC requires the filing of flight plans. We'll proceed to Rotterdam exactly as planned unless anything else goes wrong.

Remember from earlier tutorials that pilots can use time/heading/speed calculations (called dead reckoning) to follow their progress en route and estimate their positions. Read your note about the time of your entrance to this course and compare it to the current time. The time elapsed divided by the airspeed will produce the distance travelled. For example: At 170 knots airspeed, you will travel 2.8 miles every minute. If you have flown five minutes at 170 knots since entering the course, then you have travelled 14 miles beyond that point (5x2.8=14). Plot 14 miles from that point in the direction you're heading, and you'll know just about where you are. Every minute you fly this course at 170 knots, you travel another 2.8 miles. This method isn't precise, but it's close enough when precision isn't possible. Of course, you'll need to use your actual time and ground speed in the calculations, and be sure to account for your headwind, too. Use your magnetic compass for heading information.

Descend Towards Your Destination

The point where you will begin descending toward Rotterdam is determined by your altitude and descent rate. At a 750-foot-per-minute descent rate, you will need to begin descending about 35 miles from RTM. Remember our simple formula for determining when to begin descending: cruise altitude (C) less target altitude (T) times 0.003 equals distance from target in miles (D), or (C-T)*0.003=D. In this case, 13,500 – 2,000 = 11,500 * 0.003 = 35 miles.

Panel with navigation instruments covered

But how can we know when we're 35 miles from RTM when our navigation radios are inoperative? Again, we use age-old navigation techniques. By subtracting 35 miles from the 112-mile course length, we find that we should begin descending when 77 miles from the point where we began following this course. If we're travelling at 170 knots, we cover 77 miles in 27 minutes. So when 27 minutes have elapsed since we entered this course, we're approximately 77 miles from entering this course and 35 miles to RTM. After this point, we should reach RTM in about 12 minutes. Again, this method is imprecise but close enough when precision isn't possible, and you must factor your actual ground speed.

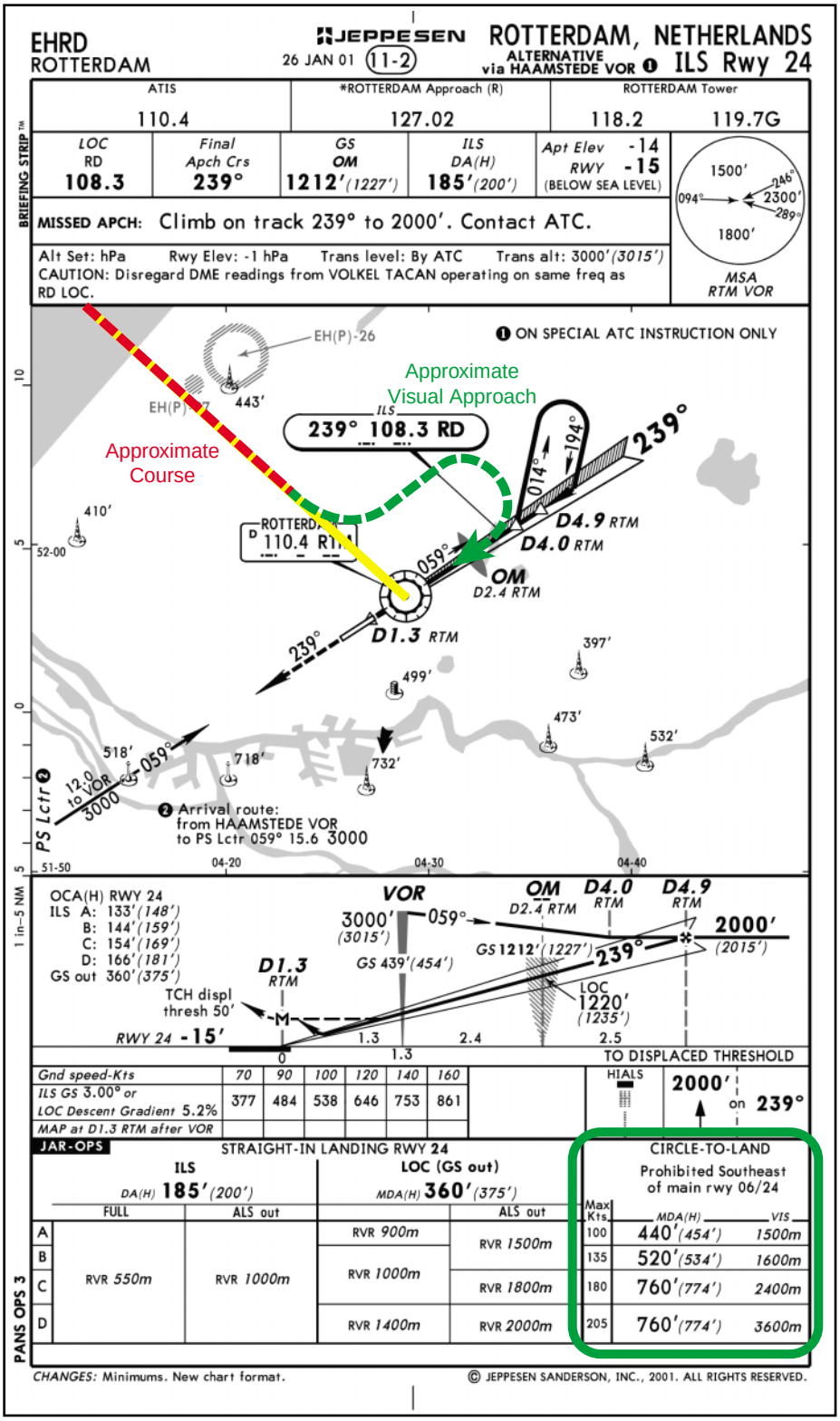
As you pass through 10,000 feet MSL on your way down, turn on your landing light. Use of landing lights below 10,000 feet is encouraged but not required by authorities. The instrument approach chart and the VFR chart show prohibited areas northwest of Rotterdam in the area of The Hague. Unless you are blown several miles off course to the left, your chances of violating these prohibited areas are slight. Of course, you'll never know for certain without radio navigation or ATC assistance.

APPROACH ROTTERDAM

When you pass the Dutch coastline (if you can see it), you're 11 miles from Rotterdam airport. In clear weather, the airport is visible from here, so begin looking for it out your left/front, front and right/front windows. It might appear through breaks in the clouds.

When you spot the airport, its position relative to you will reveal your position relative to it. If it appears ahead to the left, you are east of it. If it appears straight ahead, you are northwest of it. If it appears to the front right, you are north of it.

Weather at the airport will vary when you arrive in its airspace because of the way Microsoft Flight Simulator manages weather. The broken clouds will move from southwest to northeast (200 toward 020) at 11 knots in accordance with the weather conditions we selected before embarking on this flight. As a result of this cloud movement, exact



Approximate visual approach

Spotting the airport visually (left)

Spotting the airport visually (front)

Spotting the airport visually (right)

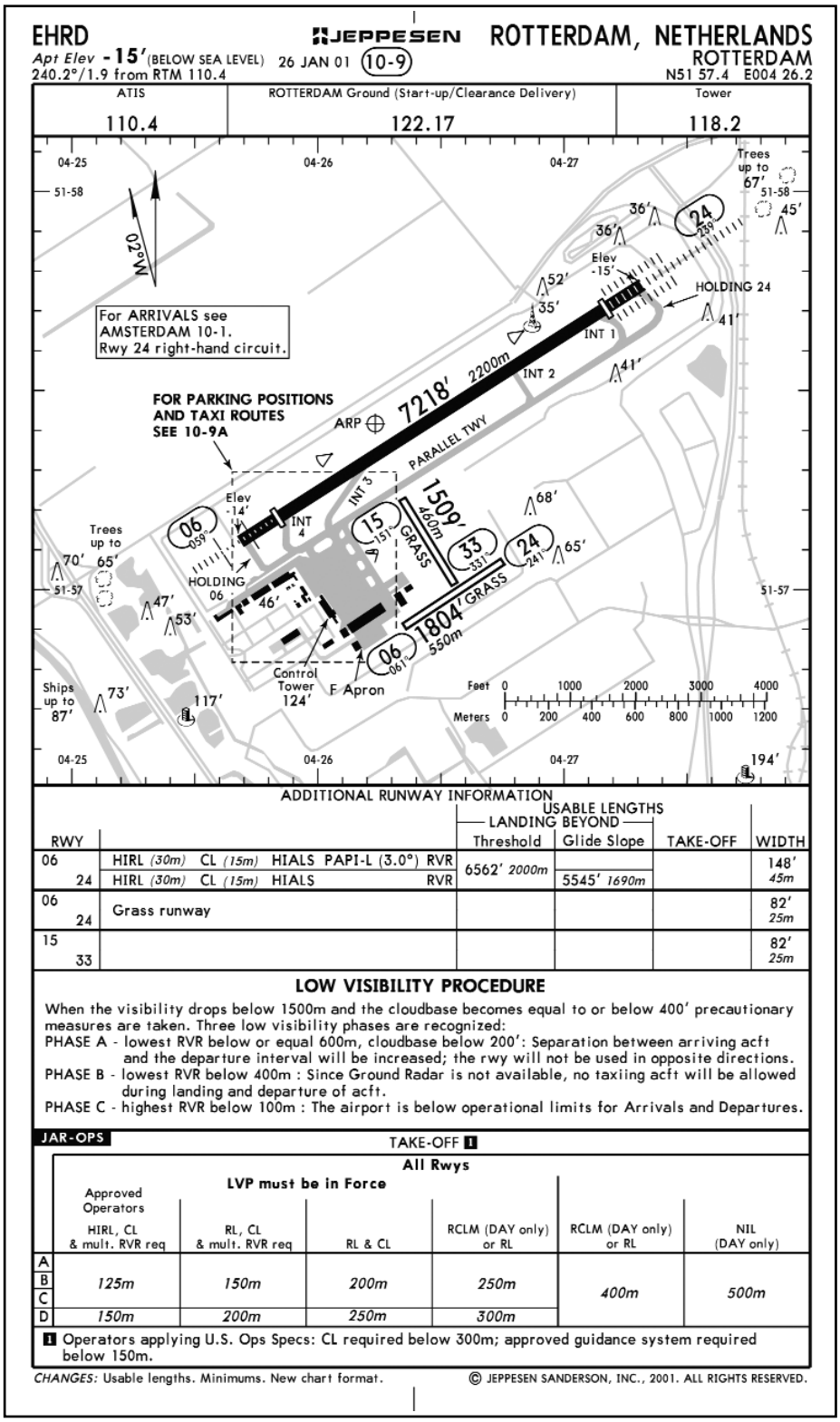
conditions will differ at various times and for various simmers. Your view upon arriving in the airport's airspace might be obscured by clouds passing through, and it might be clear. Having no ATC assistance, you just won't know until you get there.

The low terrain in the Netherlands allows us to descend below the 1,500-foot (458-metre) ceiling, so the airport should be visible soon. Once you're beneath the 1,500-foot ceiling, you should be able to fly visually to the airport.

TIP: Make a flight/situation here so you can practice entering and following the instrument course.

The Instrument Approach Procedure

Without our radios, we cannot use the instrument approach procedure prescribed for Rotterdam. Instead of the instrument procedures, we will approach the airport visually, even though visibility is low. For safety, we'll voluntarily adhere to the minimum altitudes shown in the chart's lower right.



Rotterdam airport diagram

The circle-to-land table shows minimum altitudes for various airspeeds and a prohibition on approaching from the southeast. Aircraft approaching at airspeeds up to 100 knots cannot descend below 454 feet MSL unless they are on final approach. For aircraft approaching at airspeeds up to 135 knots, the minimum is 534 feet. For up to 205 knots, it's 760 feet. Do not misread these minimums. They do not mean we must fly at these altitudes – only that we may not fly below them until final approach for landing. Also, we're not doing a circle-to-land approach; we're simply using its minimum altitudes for our own safety.

It's likely we will approach slower than 135 knots in our Bravo, so our minimum would be 534 feet. This is almost 1,000 feet below the 1,500-foot ceiling, so we should have plenty of space for spotting the airport and manoeuvring for runway alignment.

Remember that runway 24 is best for our landing because of the south-westerly wind. To land on runway 24, follow a right-turn approach from the position where you first spotted the airport visually. We cannot use a left-turn approach to runway 24, because the chart prohibits flights southeast of the runway.

With our westerly arrival and south-westerly wind, we would likely spot this airport from somewhere northwest or north of it, which would be on the right-turn pattern's downwind leg or base leg respectively. Keep watch for obstacles around the airport during your visual approach. Approach and land normally, following all typical and required visual landing procedures.

Missed Approach?

We cannot follow the prescribed missed approach procedure, either, because our radios are inoperative. So if we must abort our landing, we should simply execute a common visual go-around. Climb to 1,000 feet above the terrain, then perform a right-turn airport pattern and retry your landing on runway 24. Remember that we cannot fly southeast of this airport.

CONGRATULATIONS

You have now successfully reached, approached and landed at a commercial airport without using radio navigation aids. Well done, indeed!

Keep flying this tutorial to build your proficiency. Apply stronger winds and turbulence and advance to more sophisticated aircraft to make it more challenging if you like. For more information about navigation and instrument flying, read Bill Stack's Flight-Sim Navigation and Instrument Flying for Flight-Sim Pilots www.topskills.com/flitsim.htm.

See you next time. ■

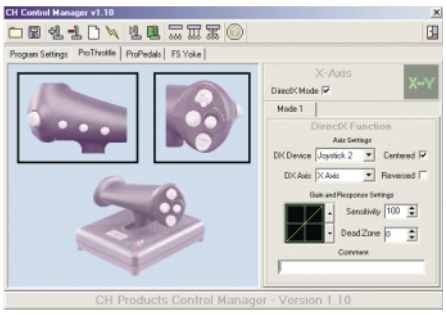
Bill Stack

CH Pro Throttle USB

CH Products get connected...

Throttle levers for joysticks and yokes have generally failed to do justice to the precision of home-built flight decks, with the possible exception of the elite group of controllers by Precision Flight Controls. Back in Issue 3 of PC Pilot we tested the game-ported CH Pro Throttle - and gave it a score of 4 overall and a big fat 5 for performance; CH Products relentlessly pursued improvements, and has recently released the USB version, a familiar looking controller with a completely different soul.

CH PRODUCTS



Improvements

The Pro Throttle is a refreshing step closer to a life-sized throttle lever for your home flight deck. It's a left-handed grip that even Neanderthal hands shouldn't have trouble with. While the overall ergonomics are much the same as before, the new USB interface is a welcome change and simplifies installation and performance; The USB simply hot-plugs into a USB port and is ready for programming in any game that recognises it.

The unit measures only eight by five inches at its base, so it won't gobble up too much precious desk space. The left-handed design is convenient for joystick users, but might fool you into thinking you're in the right-hand seat if you're flying with a yoke. If you enjoy plenty of programmable buttons and hat switches, the Pro Throttle USB certainly delivers.

Features

- 3 Four-way hat switches
- 1 Eight-way hat switch
- 3 Programmable buttons
- 69 Programmable functions
- 1 Mini-joystick
- 7-Foot cable
- LED Mode indicator
- Control Manager software
- One USB port

The 69 inputs listed in the features above refers to 23 X 3, where 23 represents the number of buttons on the throttle, and 3 refers to the number of possible 'modes'. These modes can be selected with the mini-joystick, and must be programmed using the Control Manager Software.

Installation and Configuration

The Universal Serial Bus allows the connection of devices without the need to shut off power to the computer, thus eliminating the need to reboot. With no trouble whatsoever, and in a matter of minutes, our throttle was recognised in the Gaming Options menu of the Control Panel. The first system we tested was equipped with AETI's AFCS II yoke, Simped Vario Pedals and the USB Throttle. Using Flight Simulator 2000 and 2002 as a testing environment, it was necessary to assign axes to each device. Browsing to Options/Controls/Assignments, and then selecting the Joystick Axes tab brings you to a window titled Controls Assignments. Here the elevator, aileron, rudder, throttle, propeller and mixture can be assigned an axis on the respective component.

Many simulators support multiple controllers, but there are some, such as Falcon 4.0, which need a bit of help. The Control Manager software creates virtual joysticks which are built from combinations of axes and buttons on several controllers; it uses a 'map file', created by the user, to define a new 'composite joystick'. An easy to use GUI (Graphical User Interface) helps to create a new virtual controller, and it was this method that allowed us to use the Pro Throttle in Falcon 4.0.

Performance

The Pro Throttle's rather burly handle may well feel a little awkward for pilots with small hands. Also, count on spending a little time adjusting to 'throttle on the left/yoke on the right' flying, as you would in transferring to the co-pilot's seat in a real aircraft. The throttle lever action is as smooth as silk, and moves along a flat plane rather than an arc. We found that, rather than leaving the throttle sitting perfectly flat on the desk, the front needed to be angled slightly upwards for optimum comfort and realism. We made a simple wooden base that did the trick.

Throttle response in Falcon 4.0, Combat Flight Simulator 2, and FS 2000/2002 allowed for precise control, which was particularly noticeable when manually flying an approach in a heavy aircraft. Button configuration is done within the simulation itself, allowing for 23 inputs in addition to whichever stick or yoke is being used; having the luxury of duplicating certain aircraft control commands such as brakes, elevator trim, and reverse thrust can substantially reduce the work load for the pilot (does that sound too realistic?) during an approach and landing. The button arrangement places four switches towards the front for finger activation, while the remaining three are within thumb's reach, as is the mini-joystick. The joystick, although tiny in size, actually functions quite nicely.

We tested the CH Pro Throttle with a few different sets of controllers to see what worked and what didn't. The most successful combination, to no one's surprise, was the full CH USB arsenal of the USB yoke and USB Pro Pedals. With the benefits of fuss-free installation and calibration, the entire setup was configured almost perfectly in FS 2002 using the default settings. Another noteworthy team was the AETI AFCS II yoke, Simped Vario Pedals, and Pro Throttle. The Pro Throttle improved aircraft control as its USB signals were more precise than the provided game port throttle of the yoke. We also made a valiant attempt to mate it with Microsoft's own Precision Pro joystick, but unfortunately with little success.

No complaints

CH Products has once again given the flight simulation world a great product. We would love to see a right-handed version and perhaps a slightly contoured base would be an improvement, but these are minor niggles. The device does what is promised, and moreover it does it well. Suffice to say that the Pro Throttle USB will not only up the ante on flight realism, but also make flying easier. ■

Greg Gott

REVIEW SCORE:	
Manufacturer:	CH Products
Price:	£102.00 (approx.)
Website:	www.chproducts.com
Release Date:	Out now

At a glance: A welcome USB connection for an excellent product. A right-handed version would make it close to perfect.

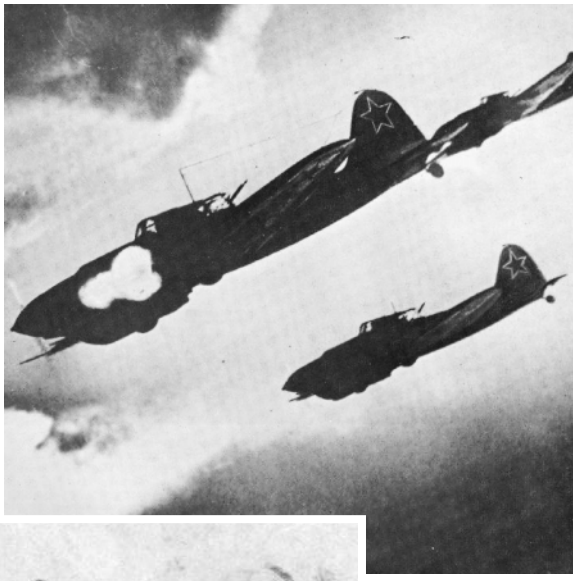
Black Cross, Red Star Volume 2: Resurgence, January to June 1942

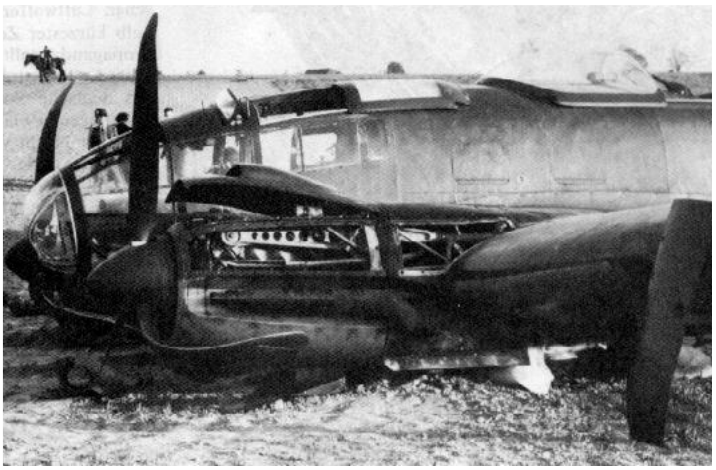
The second instalment of a definitive series

This is the second in a four-volume series devoted to the struggle for air supremacy on the Eastern Front from 1941-1943, and arrives just over a year after the first volume. Volume 1 covered the events of 1941 and Operation Barbarossa, and Volume 2 begins in January of 1942 and covers events up to June of the same year. The authors document the legacy of the invasion and operations during that first Russian winter, and the early chapters looking at the state of the two 'crippled' forces prove to be a fascinating starting point for what follows. The Soviet winter offensive is covered in detail, as is the emerging stalemate and the eventual resurgence of the Luftwaffe. The volume climaxes with the extensive air battles during the German offensives at Kharkov and against Sevastopol in May and June, 1942.

Volume 2 corrects several common myths surrounding the Orders of Battle of the two forces. The authors point out that the Soviet offensive was not that of a numerically superior Soviet force striking a paralyzed German army. On the contrary, The Soviets had exhausted their reserves and the forces which counter-attacked at the gates of Moscow were numerically inferior to the Germans.

The strength of these volumes is their wide scope of coverage, which relates the general progress of the air war to the broader sweep of the conflict. Historical accounts can sometimes drown in lists of factual data which make for dry reading, but this certainly isn't the case here; the authors' inclusion of first-person accounts heightens considerably the intensity of the narrative, as well as providing some fascinating tales. Much of the information concerning the Russians has only been available since the Soviet regime collapsed just over a decade ago, and the use of wartime records finally allows an accurate portrayal of events without the authors having to resort to conjecture and speculation. You really do get the sense of a story being told correctly for the very first time.





While this second volume is shorter than its predecessor, it adds 31 beautiful full-page colour profiles of a variety of aircraft to the 150 photographs included. In common with Volume 1, a set of maps and a detailed index and glossary are included; furthermore, the authors offer four pages of sources, as well as detailed appendices which detail Luftwaffe combat losses and the structure of the opposing air forces. Those of you who like the look of the IL-2 simulation in this issue will enjoy the descriptions of tactics for the IL-2 Sturmovik, and there's a absolute wealth of technical detail about navigation techniques, bombsights, and so on. Particularly fascinating are the pages devoted to the strengths and weaknesses of each side's planes, how they were pitted against the opposition, and how successful these tactics eventually proved to be.

A set of maps is provided to help with putting the text in context, although they are all placed on the opening pages; appropriate maps in the relevant chapters would save the reader from continually referring back to the opening of the volume. This is a small point, however, and in terms of historical information and entertainment this new volume is a worthy successor to the first. Personalities, battles and factual data are intermingled effectively, and the little known stories of the conflict on the Eastern Front continue to leap to life. Meticulous research and beautiful presentation are still the order of the day. ■

Leonard Hjalmarson

REVIEW SCORE:	
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Price:	£24.00 (approx.)
Authors:	Christer Bergstrom and Andrey Mikhailov
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Downloads

Star performers from the Internet

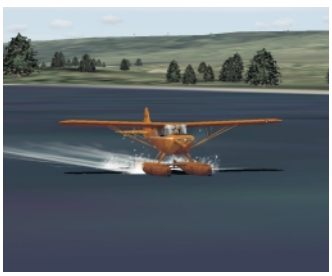
We've decided to change the format for the downloads section in this issue and provide a proper showcase for some of the outstanding freeware files uploaded to the major flight simulation websites. In many cases these compare and sometimes even surpass the quality found in commercial products so we decided to pick one item and give it a more in-depth review, then let you have a few other recommendations that we thought worthy of an honourable mention. Remember, we've downloaded these files from the website listed, so they DO exist. However, files are often hard to find and also get moved around sites, so try searching by aircraft type, or developer name.

The Canuck 80 has that lived-in appearance

Years of grime on those windows

The exterior view shows the delicate lines of the modelling

Approaching a watery touchdown



Down safely in the alternate livery

Canuck 80 — Prop Aircraft - Flight Simulator 2002

Author: Bill Lyons

Download From: flightsim.com
Filename: canuck80.zip

It's well publicised that this month heralds the release of Flight Simulator 2002, and we wondered when the freeware authors would begin churning out new aircraft and other add-ons to go with it. Well, we didn't have to wait too long; in fact there were quite a number on offer before the release date!

In order to remain topical, our first Star Download is a pair of classic Fleet Canuck 80 aircraft designed for FS2002 only and produced by Bill Lyons, a member of the Golden Eagles Squadron. These Canadian light/bush aircraft feature full 3D virtual cockpits with working gauges, animated controls, a 2D bitmap panel, checklists and a new set of sound files. The package includes both the float and wheeled versions, so you can explore the airports and the much improved coastal waters of Microsoft's latest baby. In order to get you started, the author has thoughtfully supplied a checkride flight for each plane.

If you log on to any of the flight sim sites you'll always find an abundance of heavy jets, which makes a design like this worth investigating for a bit of a contrast. Flying an aircraft with a maximum speed slightly below the take-off speed of a jet airliner requires a different sort of thinking. You need to be more relaxed about the whole thing, take in the scenery, arrive when you get there and not worry too much about timetables.

This approach is exactly what the author intended, because the aircraft are well crafted, extremely easy to fly and, under the conditions you'll find in FS2002, you get more time to enjoy the simple pleasures of flight. The external views show that the models are nicely detailed, with delicate wing struts, braces and radio antennae. Mounted on an airframe that looks decidedly lived in, its slightly worn and weathered textures betray the age of the craft. Whereas the cockpit interior can only be described as tatty, the plexiglas windows are crazed and yellowing with age, and the paint on the dashboard has long ago lost its shine.

This is not a criticism, but a confirmation that when a designer goes to this much trouble to recreate a classic aircraft, you can't help but be impressed. On the other hand it's not all cosmetic; the flight model is realistic and stable, to the point where you would have to try hard to crash it. The cockpit is equipped with modern avionics and the 3D virtual cockpit is actually more enjoyable to fly than the 2D version.

Inevitably the Canuck is not going to be everyone's choice but it offers a new experience for those who normally fly the heavy metal, particularly if you've never flown a tail-dragger before. ■

Joe Lavery

On top of the world

That spray looks brilliant in FS2002

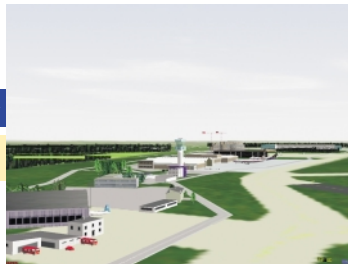
The rest of the best

B747-200 Airforce One — Jet Aircraft - Flight Simulator 2000

Author: Jon Murchison
Download from: flightsim.com
Filename: af1-2.zip

Falcon 50 — Jet Aircraft - Flight Simulator 2000

Author: Yannick Lavigne
Download from: flightsim.com
Filename: fal50c1.zip



Luxembourg ELLX — Scenery - Flight Simulator 2000

Author: Christopher Rieger
Download from: flightsim.com
Filename: ellx.zip

King Air C90 — Prop Aircraft - Flight Simulator 2000

Author: Kazuyoshi Furuya
Download from: flightsim.com
Filename: c90_pri.zip

Heinkel He 177 — Prop Aircraft - Flight Simulator 2000 Pro

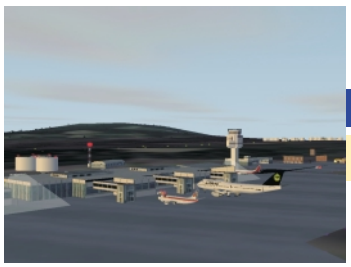
Author: Hauke Keitel
Download from: flightsim.com
Filename: he177a5.zip

ERJ-145 Instrument Panel — Jet Panel - Flight Simulator 2000

Author: Bill Grabowski
Download from: flightsim.com
Filename: erj_grab.zip

Canadair CL 215 — Prop Aircraft - Flight Simulator 2000

Author: Massimo Taccoli
Download from: fsfreeware.com
Filename: cl215_th.zip

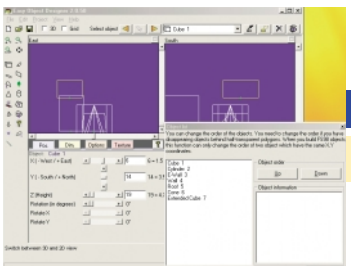


Canary Islands — Scenery - Flight Simulator 2000

Author: Toni Agramont
Download from: flightsim.com
Filename: canary02.zip

F/A-18C Hornet — Jet Fighter - Flight Simulator 2000

Author: Dean Reime
Download from: flightsim.com
Filename: cvw5-300.zip



Easy Object Designer — Scenery - Flight Simulator 2000

Author: Matthias Brueckner
Download from: flightsim.com
Filename: eodin045.zip

Hawaiian DC-10 — Jet Aircraft - X-Plane

Author: Jorge Rocafort
Download from: flightsim.com
Filename: hawadc10.zip

THE *ONLY* HUB FOR VIRTUAL AIRLINES

PS1 Virtual

cargolux
Precision Simulator 1.3a Website

The PS1 community is more interested in flying than in some of the other trappings of VA membership, but several organisations exist to bring together devotees of the 747-400. Stevens Virtual Airlines is maintained by real-world commercial jet pilots, whose goal is to be as realistic as possible in their operations. Luxembourg-based Cargolux is not really a VA, but rather a cargo airline offering a collection of real-world Cargolux routes, covering around 52 destinations and 159 route packages across five continents. FlightLine is not actually a VA at all (there are no schedules, hubs, flight plans or fancy livery) but a fleet of planes that can be used by everybody to enjoy flying a plane that has already been flown by many other people before - the plane and every switch in the cockpit are in exactly the same position as the previous pilot left it, and you can review the plane's log book to see what previous pilots have encountered. Knight Air, on the other hand, is a more traditional VA, which caters for PS1 enthusiasts.

Mark Embleton

CONTACT DETAILS

Stevens Virtual Airlines
http://schweizer110.virtualave.net/Stevens/Index.htm

Cargolux
http://www.vbmc.demon.nl/cargolux/

FlightLine
http://infolab.kub.nl/people/hoppie/ps1/fl/

Knight Air
http://lhr.knightair.org/ps1/

MORE VAs AROUND THE GLOBE

It's getting increasingly risky running a VA based on a real airline. We'd strongly suggest that anyone running such a VA or planning one, gets some written authorisation. Most airlines will probably say no, but if you put your case logically to the PR department that you're 'fans' they might well understand. We've had so many requests to include details of VAs that for reasons of space it's been necessary to only include their name and web address. You can always get the flavour of a VA from a quick trip to their website. Please let us have any feedback on your experience of VAs that we list and also let us know if any of the links are incorrect or defunct. If you have a virtual airline that is not listed here, then please feel free to send in a short description to mail@pcpilot.net where we will endeavour to include it in a future issue.

60th HELICOPTER SUPPORT UNIT
WEB: www.geocities.com/60thvaw/60thhsu/index.html

A & B AIRLINES
WEB: www.geocities.com/ab_airlines

AFRICAN EXPRESS (AFEX)
WEB: www.afex.co.za

AIR JET UK
WEB: www.flightsimnetwork.com/airjet/

AIR UMBRELLA
WEB: www.airumbrella.com

AIR WE GO
WEB: www.airwego.org.uk/

AIRKENT UK
WEB: www.airkentuk.co.uk/

AIRSOURCE VIRTUAL EMPLOYER
WEB: www.ar-source.com

ALASKA VIRTUAL AIRLINES
WEB: http://alaska_va.tripod.com/

ATLANTIC AEROSPACE CORPORATION
WEB: www.atlanticskies.com

BRITISH VIRTUAL AIRWAYS
WEB: www.bvair.com

CALIFORNIA AIR
WEB: www.californiaAir.net

CANARY AIRLINES
WEB: http://cairlines.wigloo.com

CARGO VA
WEB: www.cargova.com

CARGOLUX
WEB:http://www.vbmc.demon.nl/cargolux/

DC3 AIRWAYS
WEB: www.dc3airways.com

EASTERN VIRTUAL AIRLINES
WEB: www.evair.com/index.htm

EURO LIVEWIRE AIRLINES
WEB: : www.eurolivewire.com

EUROPAIR VIRTUAL AIRLINES
WEB: www.europairva.net

EUROPEAN WORLD AIRWAYS
WEB: http://ewa.ibusinessdot.com

EUROSTAR AVIATION
WEB: www.esava.net

FLIGHTLINE
WEB:http://infolab.kub.nl/people/hoppie/ps1/fl/

GO-VIRTUAL
WEB: www.trudg.freeserve.co.uk

HAWAIIAN AIRLINES VA
WEB: www.gorji.com/hawaii.html

ICELAND AIR
WEB: www.allineed.is/icelandairva

JERSEY GROUP OF AIRLINES
WEB: www.jersey-va.co.uk

JGO INTERNATIONAL AIRLINES
WEB: www.virtualjgo.8m.com

JMC VIRTUAL AIRLINES
WEB: www.virtualjmc.homestead.com/main.html

KNIGHT AIR
WEB: www.knightair.org

LIVEWIRE VIRTUAL AIRLINES
WEB: www.livewireairlines.com

MANCHESTER AIRWAYS VA
WEB: http://manchester.atcworldstar.com

MAVERIC VA
WEB: www.mavericva.co.uk

NEW YORK CENTRAL & ADIRONDACK VA
WEB: www.flightsimmers.net/airport/nva/

NOBLE AIR
WEB: www.nobleair.com

NORTHWEST VIRTUAL AIRLINES
WEB: www.groverweb.com/nwva/

OXAIR VIRTUAL AIRLINES
WEB: www.oxair.homestead.com

PACIFIC WEST AIRWAYS
WEB: www.pacificwestairways.com

PARADISE WORLD AVIATION
WEB: www.pwaviation.com

POLAR AIRWAYS VIRTUAL AIRLINE
WEB: www.polarairways.com/

SOLENT AIRLINES
WEB: www.solentairlines.btinternet.co.uk

SOUTHWEST VIRTUAL
WEB: http://www.virtualswa.com

STEVENS VIRTUAL AIRLINES
WEB: http://schweizer110.virtualave.net/Stevens/Index.htm

TEXAS AIR CARGO
WEB: www.geocities.com/texas_air_cargo/

TRANSVIRTUAL AIRLINES
WEB: www.transvirtualairlines.org

VIRGIN SUN
WEB: www.members.aol.com/Afre63456/vvs/

VIRTUAL BRITISH CALEDONIAN AIRWAYS
WEB: www.avsim.com/hangar/air/vbca/index.html

VIRTUAL DELTA AIRLINES
WEB: http://virtualdelta.cjb.net/

WEST EUROPEAN AIRLINES
WEB: www.weva.homestead.com/main.html

WESTWIND VA
WEB: www.flywestwind.com

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